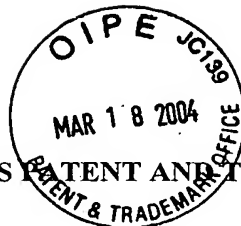


Imap

Docket No. 219885US3



AF2852

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Yuji ARAI, et al.

SERIAL NO: 10/092,488

GAU: 2852

FILED: March 8, 2002

EXAMINER: Robert BEATTY

FOR: RECOVERED TONER CLASSIFIER CAPABLE OF EFFECTIVELY REMOVING FOREIGN SUBSTANCE AND CRUSHING AGGREGATION OF TONER

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Applicant(s) wish to disclose the following information.

REFERENCES

- ☐ The applicant(s) wish to make of record the references listed on the attached form PTO-1449. Copies of the listed references are attached, where required, as are either statements of relevancy or any readily available English translations of pertinent portions of any non-English language references.
- ☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

RELATED CASES

- ☒ Attached is a list of applicant's pending application(s) or issued patent(s) which may be related to the present application. A copy of the claims and drawings of the pending applications are attached.
- ☒ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

CERTIFICATION

- ☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement.
- ☒ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned, having made reasonable inquiry, was known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this statement.

DEPOSIT ACCOUNT

- ☒ Please charge any additional fees for the papers being filed herewith and for which no check or credit card payment is enclosed herewith, or credit any overpayment to deposit account number 15-0030. A duplicate copy of this sheet is enclosed.

03/19/2004 HALI11 00000050 10092488

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Respectfully submitted,

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(OSMMN 05/03)

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LIST OF RELATED CASES

<u>Docket Number</u>	<u>Serial or Patent Number</u>	<u>Filing or Issue Date</u>	<u>Inventor/ Applicant</u>
219885US3*	10/092,488	03/08/02	ARAI et al.
246577US3	10/740,665	12/22/03	NAGASHIMA et al.

*Present Application; listed for information
GJM/akh

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LIST OF RELATED CASES

<u>Docket Number</u>	<u>Serial or Patent Number</u>	<u>Filing or Issue Date</u>	<u>Inventor/ Applicant</u>
219885US3*	10/092,488	03/08/02	ARAI et al.
247089US3	10/742,835	12/23/03	TSUDA et al.

*Present Application; listed for information

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CLAIMS:

1. An image forming apparatus, comprising:

a frame;

a plurality of process cartridges; and

a guide mounted to the frame, the guide including a plurality of guide portions having supporting surfaces arranged at predetermined different heights and on which the plurality of process cartridges are detachably placed, and configured to guide the plurality of process cartridges placed on the supporting surfaces along a path between respective first positions and respective second positions.

2. The image forming apparatus according to Claim 1, wherein the plurality of process cartridges sequentially form color toner images with toners of predetermined colors different from each other to form a full-color image in each of image forming cycles, each of the plurality of process cartridges comprising:

an image bearing member having a surface on which a latent image for a toner of a corresponding color of the toners of the predetermined colors is formed; and

at least a part of an image forming mechanism integrally mounted with the image bearing member, the image forming mechanism being configured to form a corresponding color toner image based on the latent image formed on the image bearing member.

3. The image forming apparatus according to Claim 1, wherein each of the respective first positions is a position at which a corresponding process cartridge of the plurality of process cartridges is placed for installation and is removed for exchange, and each of the respective second positions is a position at which a corresponding process cartridge of the plurality of process cartridges is made operable, the respective second positions being arranged in line with a decrease in vertical height along a direction such that a position of the

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respective second positions having a lowest vertical height is a position for a process cartridge that lastly forms a toner image among the plurality of process cartridges in one image forming cycle.

4. The image forming apparatus according to Claim 1, wherein each of the supporting surfaces of the plurality of guide portions arranged at the predetermined different heights is arranged approximately horizontal.

5. The image forming apparatus according to Claim 2, wherein each of the supporting surfaces of the plurality of guide portions arranged at the predetermined different heights is arranged to be inclined relative to a horizontal plane.

6. The image forming apparatus according to Claim 5, wherein each of the plurality of guide portions comprises a plurality of supporting members configured to respectively contact at least bottom and side surfaces of a corresponding process cartridge among the plurality of process cartridges to support the corresponding process cartridge.

7. The image forming apparatus according to Claim 5, further comprising:
a transfer belt including a belt portion held in contact with the image bearing member of each of the plurality of process cartridges,

wherein the belt portion of the transfer belt and a slope that each of the supporting surfaces of the plurality of guide portions is arranged to be inclined relative to the horizontal plane are parallel to each other.

8. The image forming apparatus according to Claim 1, wherein each of the plurality of guide portions includes a regulating member for regulating a displacement movement of a corresponding process cartridge among the plurality of process cartridges in a direction parallel to the supporting surfaces and perpendicular to a moving direction of the corresponding process cartridge during a time the corresponding process cartridge is guided by a corresponding guide portion of the plurality of guide portions.

9. The image forming apparatus according to Claim 1, wherein each of the plurality of guide portions includes a regulating member for rejecting placement of an incorrect process cartridge among the plurality of process cartridges.

10. The image forming apparatus according to Claim 1, wherein the guide is configured to move in a vertical direction.

11. The image forming apparatus according to Claim 1, wherein the plurality of guide portions of the guide are configured to move individually in a vertical direction.

12. The image forming apparatus according to Claim 6, wherein the plurality of supporting members included in each of the plurality of guide portions of the guide comprise respective regulators having a predetermined length for regulating movements of a corresponding process cartridge of the plurality of process cartridges in respective directions other than a moving direction of the corresponding process cartridge during a time the corresponding process cartridge is guided.

13. The image forming apparatus according to Claim 12, wherein the predetermined length of the respective regulators is shorter than an entire length of the corresponding process cartridge.

14. The image forming apparatus according to Claim 2, further comprising:
a cover configured to be moved between opening and closing positions and having a precision positioning shape for fixing the image bearing members of the plurality of process cartridges located at the respective second positions to predetermined precision positions when being moved to the closing position.

15. The image forming apparatus according to Claim 12, wherein one of the respective regulators of the plurality of supporting members included in each of the plurality of guide portions of the guide determines a predetermined precision position for the corresponding process cartridge of the plurality of process cartridges in a length direction of the corresponding process cartridge at a corresponding one of the second positions.

16. The image forming apparatus according to Claim 15, wherein each of the plurality of process cartridges includes a lever configured to be moved between set and release positions and to set the corresponding process cartridge of the plurality of process cartridges to the predetermined precision position and to release the corresponding process cartridge from the predetermined precision position.

17. The image forming apparatus according to Claim 2, further comprising:
a plurality of toner bottles for containing the toners of the predetermined colors different from each other, wherein each of the plurality of toner bottles is configured to be

detachable from the image forming apparatus independent from a corresponding process cartridge of the plurality of process cartridges.

18. An image forming apparatus, comprising:

a frame;

a plurality of process cartridges configured to sequentially form color toner images with toners of predetermined colors different from each other to form a full-color image in each image forming cycle; and

means for holding the plurality of process cartridges that are downwardly placed thereto at predetermined different heights and for guiding the plurality of process cartridges along a path between respective first positions to respective second positions.

19. The image forming apparatus according to Claim 18, wherein the plurality of process cartridges sequentially form the color toner images with the toners of the predetermined colors different from each other to form a full-color image in each of image forming cycles, each of the plurality of process cartridges comprising:

an image bearing member for bearing a latent image for a toner of a corresponding color of the toners of the predetermined colors; and

an image forming member for forming a corresponding color toner image based on the latent image formed by the image bearing member.

20. The image forming apparatus according to Claim 18, wherein each of the respective first positions is a position at which a corresponding process cartridge of the plurality of process cartridges is placed or removed and each of the respective second

positions is a position at which a corresponding process cartridge of the plurality of process cartridges is made operable.

21. The image forming apparatus according to Claim 18, wherein the means for holding and for guiding includes guiding supporting surfaces arranged approximately horizontal for supporting the plurality of process cartridges.

22. The image forming apparatus according to Claim 18, wherein the means for holding and for guiding includes supporting surfaces arranged to be inclined relative to a horizontal plane for supporting the plurality of process cartridges.

23. The image forming apparatus according to Claim 22, wherein the means for holding and for guiding contacts at least bottom and side surfaces of a corresponding process cartridge among the plurality of process cartridges to support the corresponding process cartridge.

24. The image forming apparatus according to Claim 22, further comprising:
means for superimposing the color toner images formed by the plurality of process cartridges at a plurality of superimposing points,

wherein a plane connecting the plurality of superimposing points provided by the means for superimposing and a slope that each of the supporting surfaces of the means for holding and guiding is arranged to be inclined relative to the horizontal plane are parallel to each other.

25. The image forming apparatus according to Claim 21, wherein the means for holding and for guiding includes a plurality of regulating members each for regulating a displacement movement of a corresponding process cartridge among the plurality of process cartridges in a direction parallel to the supporting surfaces and perpendicular to a moving direction of the corresponding process cartridge during a time the corresponding process cartridge is guided by the means for holding and for guiding.

26. The image forming apparatus according to Claim 18, wherein the means for holding and for guiding includes a plurality of regulating members each for rejecting placement of an incorrect process cartridge among the plurality of process cartridges.

27. The image forming apparatus according to Claim 24, wherein the means for holding and for guiding moves the plurality of process cartridges in contact with the image superimposing means in a direction away from the means for superimposing and perpendicular to a plane of the image superimposing points.

28. The image forming apparatus according to Claim 27, wherein the means for holding and for guiding moves each of the plurality of process cartridges individually.

29. The image forming apparatus according to Claim 22, wherein the means for holding and for guiding regulates movements of a corresponding process cartridge of the plurality of process cartridges for a predetermined distance in respective directions other than a moving direction of the corresponding process cartridge during a time the means for holding and for guiding guides the corresponding process cartridge.

30. The image forming apparatus according to Claim 29, wherein the predetermined distance is shorter than an entire length of the corresponding process cartridge.

31. The image forming apparatus according to Claim 18, further comprising:
means for enclosing and fixing the plurality of process cartridges at predetermined precision positions.

32. The image forming apparatus according to Claim 29, wherein the means for holding and for guiding determines a predetermined precision position for a corresponding process cartridge of the plurality of process cartridges in a length direction of the corresponding process cartridge at a corresponding one of the second positions.

33. The image forming apparatus according to Claim 31, wherein each of the plurality of process cartridges includes a lever configured to be moved between set and release positions and to set a corresponding process cartridge of the plurality of process cartridges to the predetermined precision position and to release the corresponding process cartridge from the predetermined precision position.

34. The image forming apparatus according to Claim 18, further comprising:
a plurality of toner bottles for containing the toners of the predetermined colors different from each other, wherein each of the plurality of toner bottles is configured to be detachable from the image forming apparatus independent from a corresponding process cartridge of the plurality of process cartridges.

35. A method of a process cartridge loading arrangement for an image forming apparatus, comprising:

providing a guide including a plurality of guide portions having supporting surfaces arranged at predetermined different heights;

placing a plurality of process cartridges detachably on the supporting surfaces of the plurality of guide portions of the guide; and

guiding the plurality of process cartridges placed on the supporting surfaces from respective first positions to respective second positions.

36. The method according to Claim 35, wherein the plurality of process cartridges sequentially form color toner images with toners of predetermined colors different from each other to form a full-color image in each of image forming cycles, each of the plurality of process cartridges comprising:

an image bearing member having a surface on which a latent image for a toner of a corresponding color of the toners of the predetermined colors is formed; and

at least a part of an image forming mechanism integrally mounted with the image bearing member, the image forming mechanism being configured to form a corresponding color toner image based on the latent image formed on the image bearing member.

37. The method according to Claim 35, wherein each of the respective first positions is a position at which a corresponding process cartridge of the plurality of process cartridges is placed for installation and is removed for exchange, and each of the respective second positions is a position at which a corresponding process cartridge of the plurality of process cartridges is made operable, the respective second positions being arranged in line with a decrease in vertical height along a direction such that a position of the respective second

positions having a lowest vertical height is a position for a process cartridge that lastly forms a toner image among the plurality of process cartridges in one image forming cycle.

38. The method according to Claim 35, wherein each of the supporting surfaces of the plurality of guide portions arranged at the predetermined different heights is arranged approximately horizontal.

39. The method according to Claim 35, wherein each of the supporting surfaces of the plurality of guide portions arranged at the predetermined different heights is arranged to be inclined relative to a horizontal plane.

40. The method according to Claim 39, wherein each of the plurality of guide portions comprises a plurality of supporting members configured to respectively contact at least bottom and side surfaces of a corresponding process cartridge of the plurality of process cartridges to support the corresponding process cartridge.

41. The method according to Claim 39, further comprising:
arranging a transfer belt such that a belt portion of the transfer belt contacts image bearing members of the plurality of process cartridges and is parallel to a slope at which each of the supporting surfaces of the plurality of guide portions is arranged.

42. The method according to Claim 35, wherein each of the plurality of guide portions includes a regulating member for regulating a displacement movement of a corresponding process cartridge among the plurality of process cartridges in a direction parallel to the supporting surfaces and perpendicular to a moving direction of the

corresponding process cartridge during a time the corresponding process cartridge is guided by a corresponding guide portion of the plurality of guide portions.

43. The method according to Claim 35, wherein each of the plurality of guide portions includes a regulating member for rejecting placement of an incorrect process cartridge among the plurality of process cartridges.

44. The method according to Claim 35, wherein the guide is configured to move in a vertical direction.

45. The method according to Claim 35, wherein the plurality of guide portions of the guide are configured to move individually in a vertical direction.

46. The method according to Claim 39, wherein the plurality of supporting members included in each of the plurality of guide portions of the guide comprise respective regulators having a predetermined length for regulating movements of a corresponding process cartridge of the plurality of process cartridges in respective directions other than a moving direction of the corresponding process cartridge during a time a corresponding guide portion of the plurality of guide portions guides the corresponding process cartridge.

47. The method according to Claim 46, wherein the predetermined length of the respective regulators is shorter than an entire length of the corresponding process cartridge.

48. The method according to Claim 35, further comprising:

moving a cover to a closing position to fix image bearing members of the plurality of process cartridges located at the respective second positions to predetermined precision positions.

49. The method according to Claim 40, wherein one of the respective regulators of the plurality of supporting members included in each of the plurality of guide portions of the guide determines a predetermined precision position for a corresponding process cartridge of the plurality of process cartridges in a length direction of the corresponding process cartridge at a corresponding one of the respective second positions.

50. The method according to Claim 49, wherein each of the plurality of process cartridges includes a lever configured to be moved between set and release positions and to set a corresponding process cartridge of the plurality of process cartridges to the predetermined precision position and to release the corresponding process cartridge from the predetermined precision position.

51. The method according to Claim 36, further comprising:
providing a plurality of toner bottles for containing the toners of the predetermined colors different from each other,
wherein each of the plurality of toner bottles is configured to be detachable from the image forming apparatus independent from a corresponding process cartridge of the plurality of process cartridges.

52. A detachable process cartridge for an image forming apparatus, comprising:

a bottom having an approximately plane surface held in contact by a supporting member of the image forming apparatus; and

a side surface comprising an engaging portion configured to engage with a guide of the image forming apparatus.

53. The detachable process cartridge according to Claim 52, wherein the side surface further comprises a positioning portion configured to determine a precision position for the detachable process cartridge relative to the image forming apparatus.

ABSTRACT OF THE DISCLOSURE

An image forming apparatus includes a frame, a plurality of process cartridges, and a guide mounted to the frame. The guide mounted to the frame includes a plurality of guide portions having supporting surfaces arranged at predetermined different heights and on which the plurality of process cartridges are detachably placed, and is configured to guide the plurality of process cartridges placed on the supporting surfaces along a path between respective first positions and respective second positions.

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FIG. 1

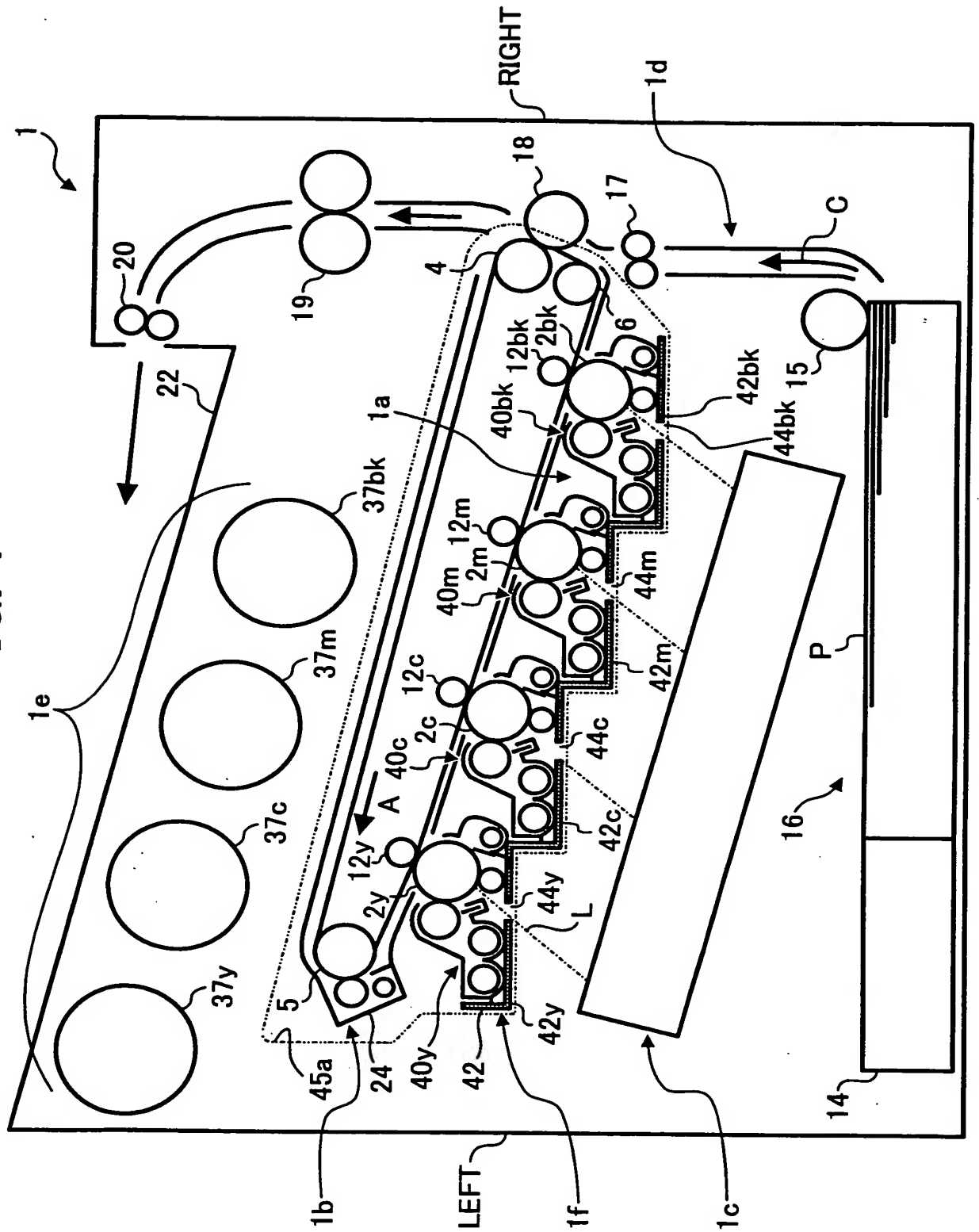


FIG. 2

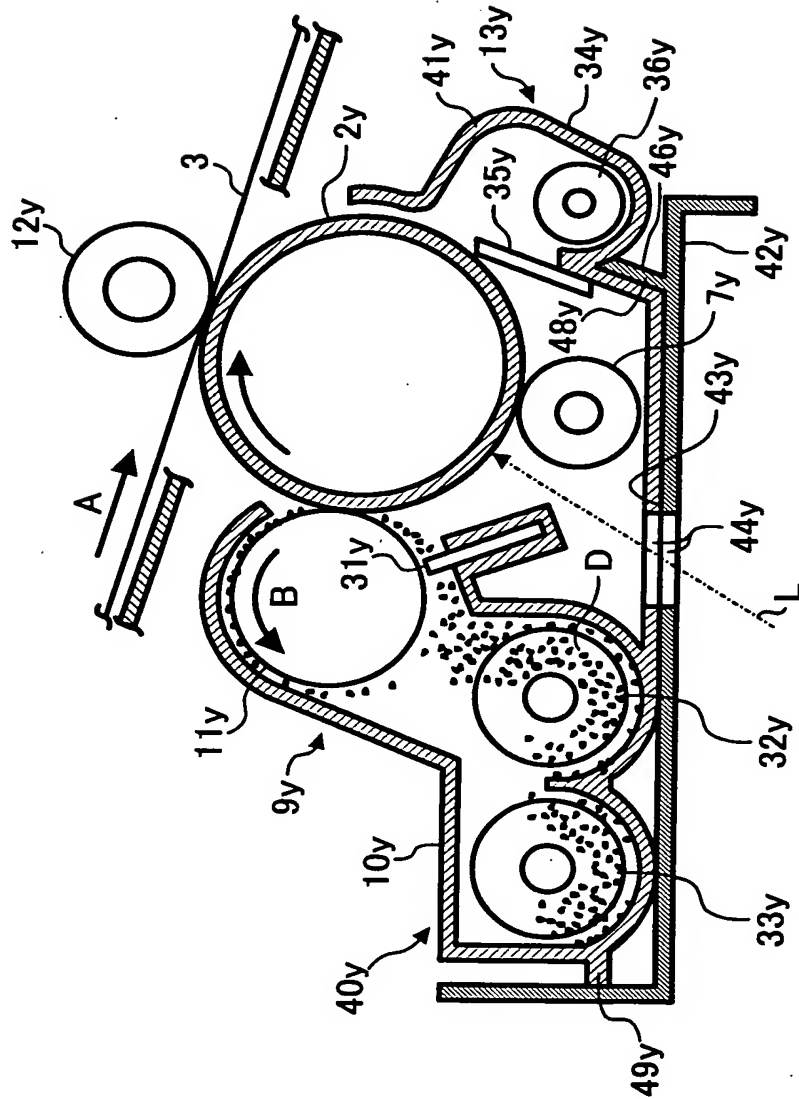


FIG. 3

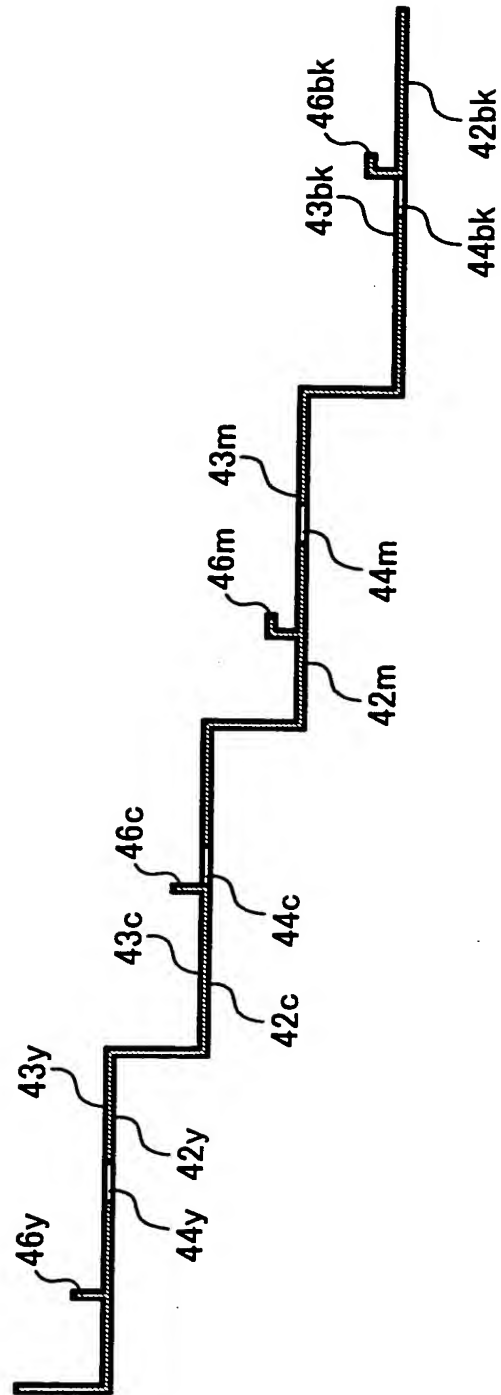


FIG. 4

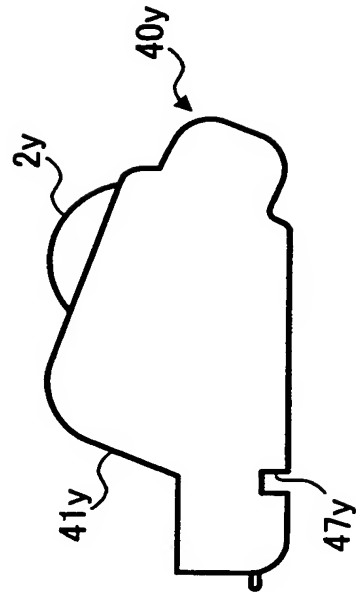
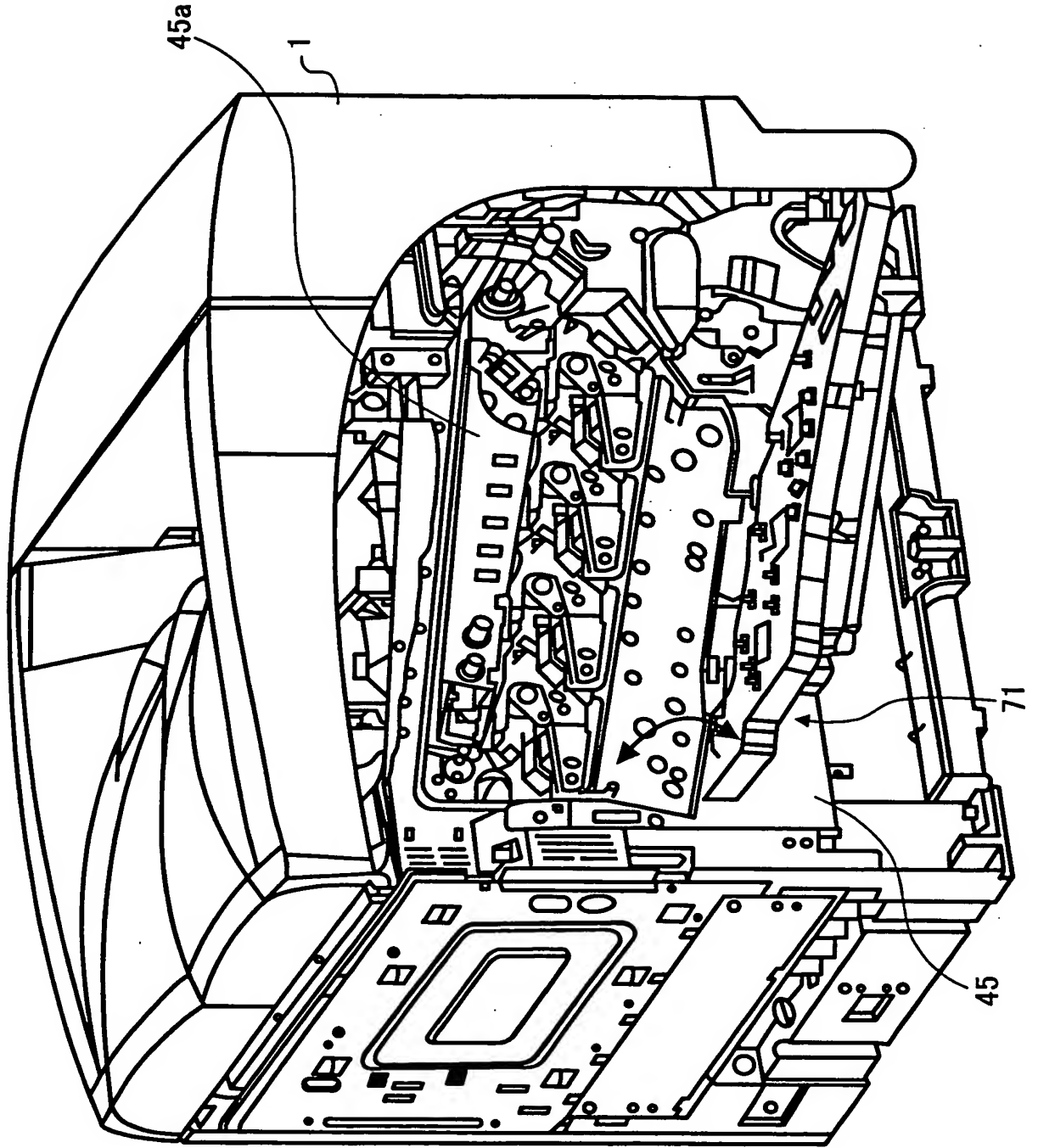


FIG. 5



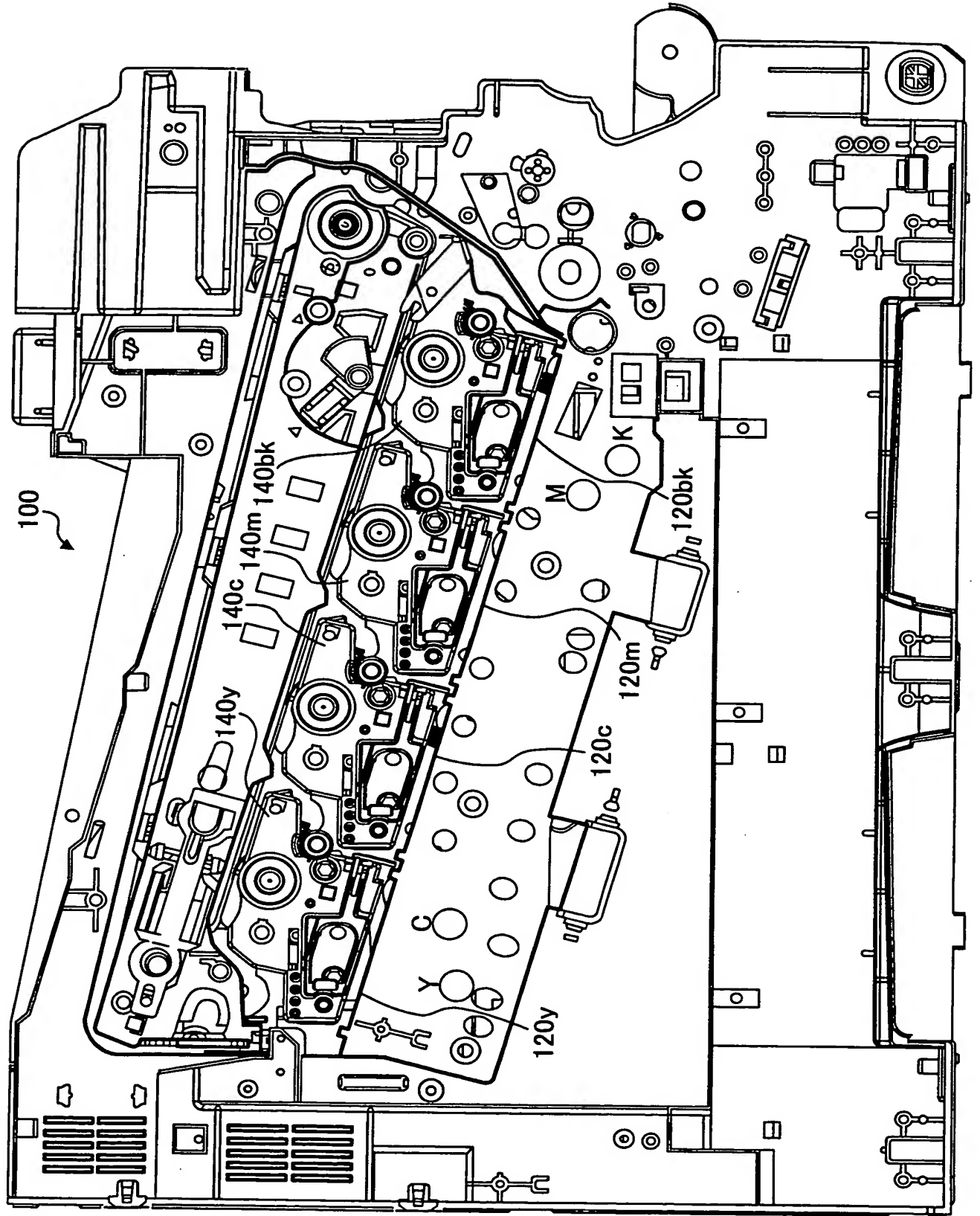


FIG. 6

FIG. 7

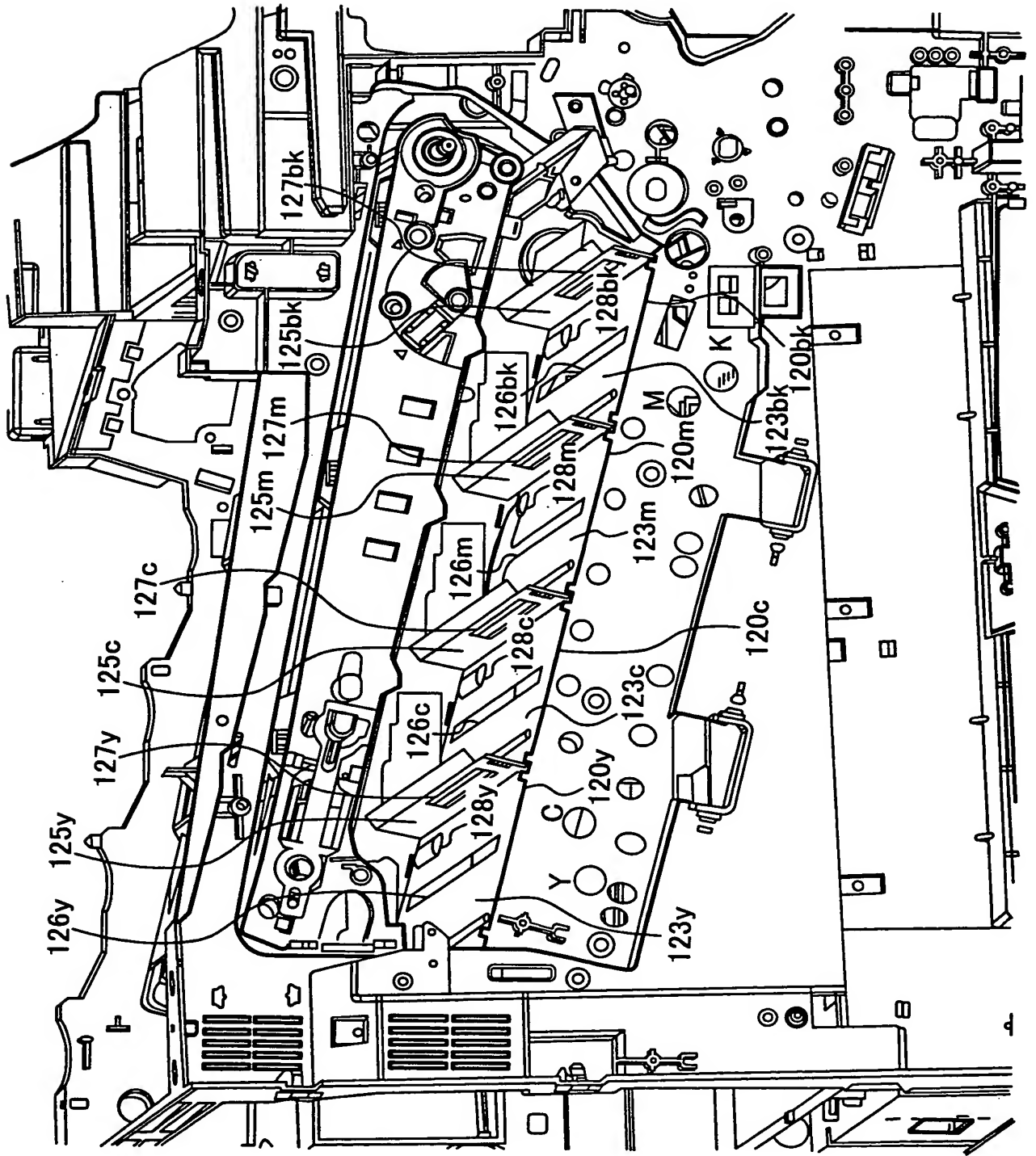


FIG. 8

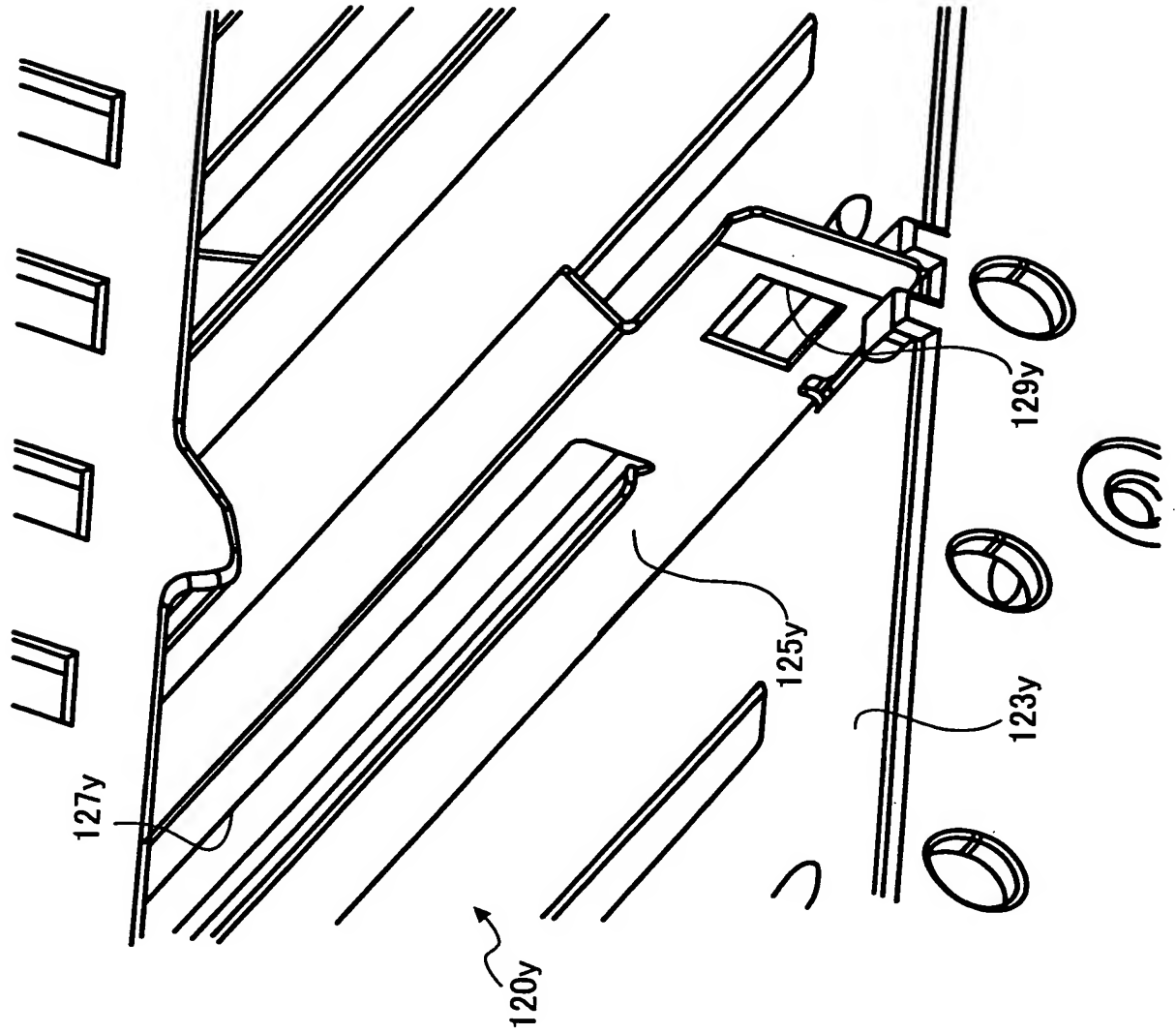


FIG. 9

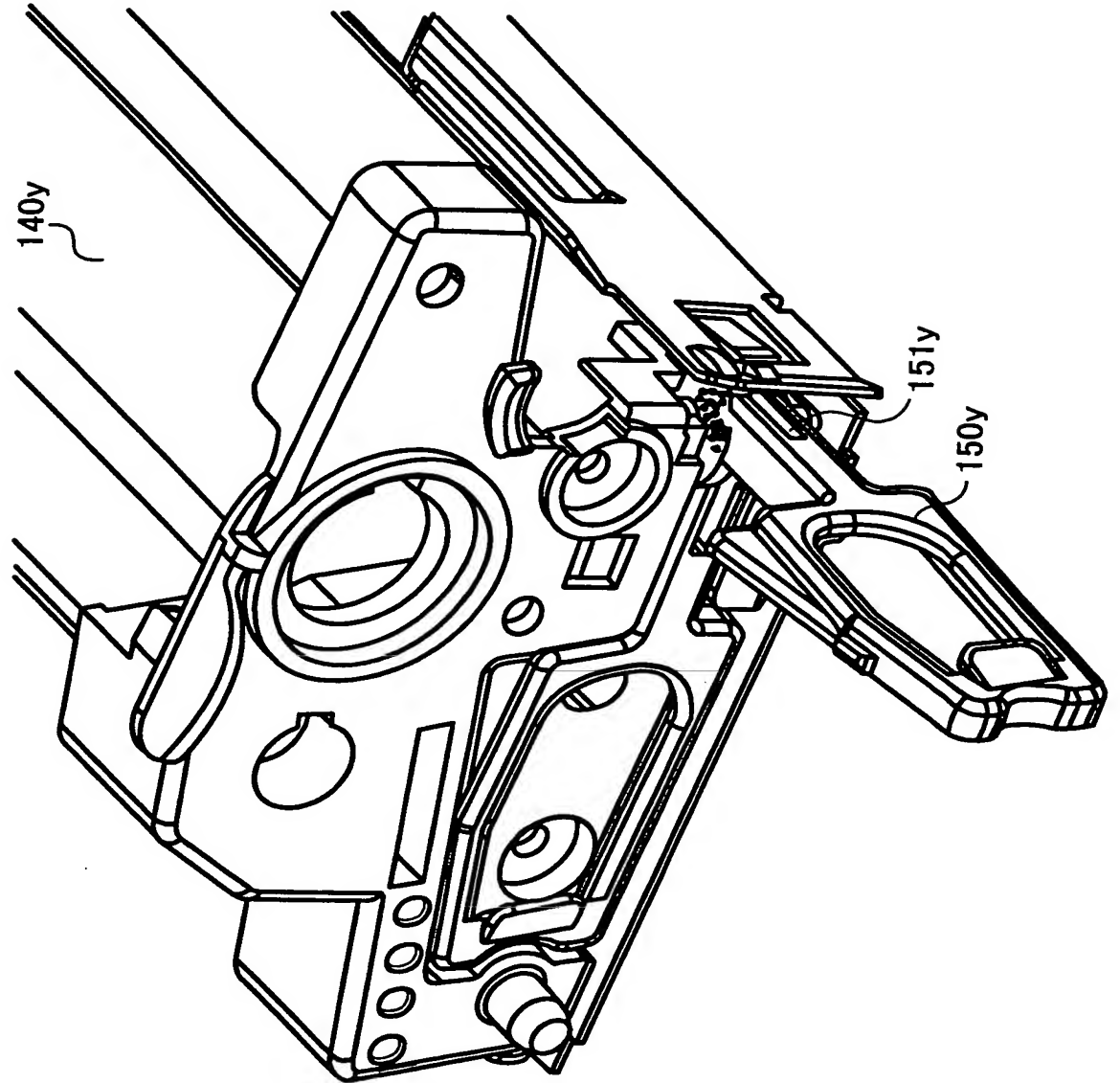


FIG. 10

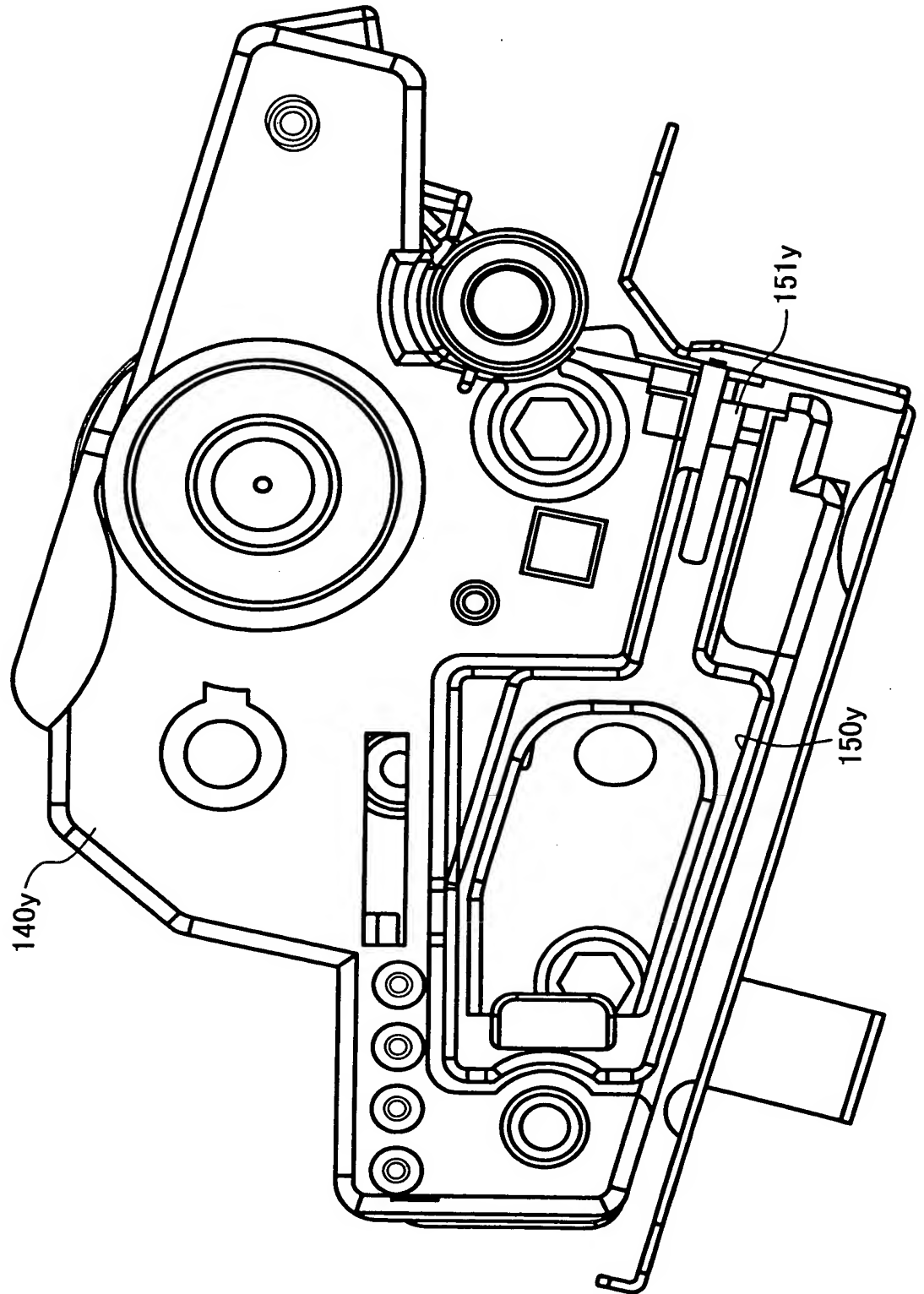


FIG. 11

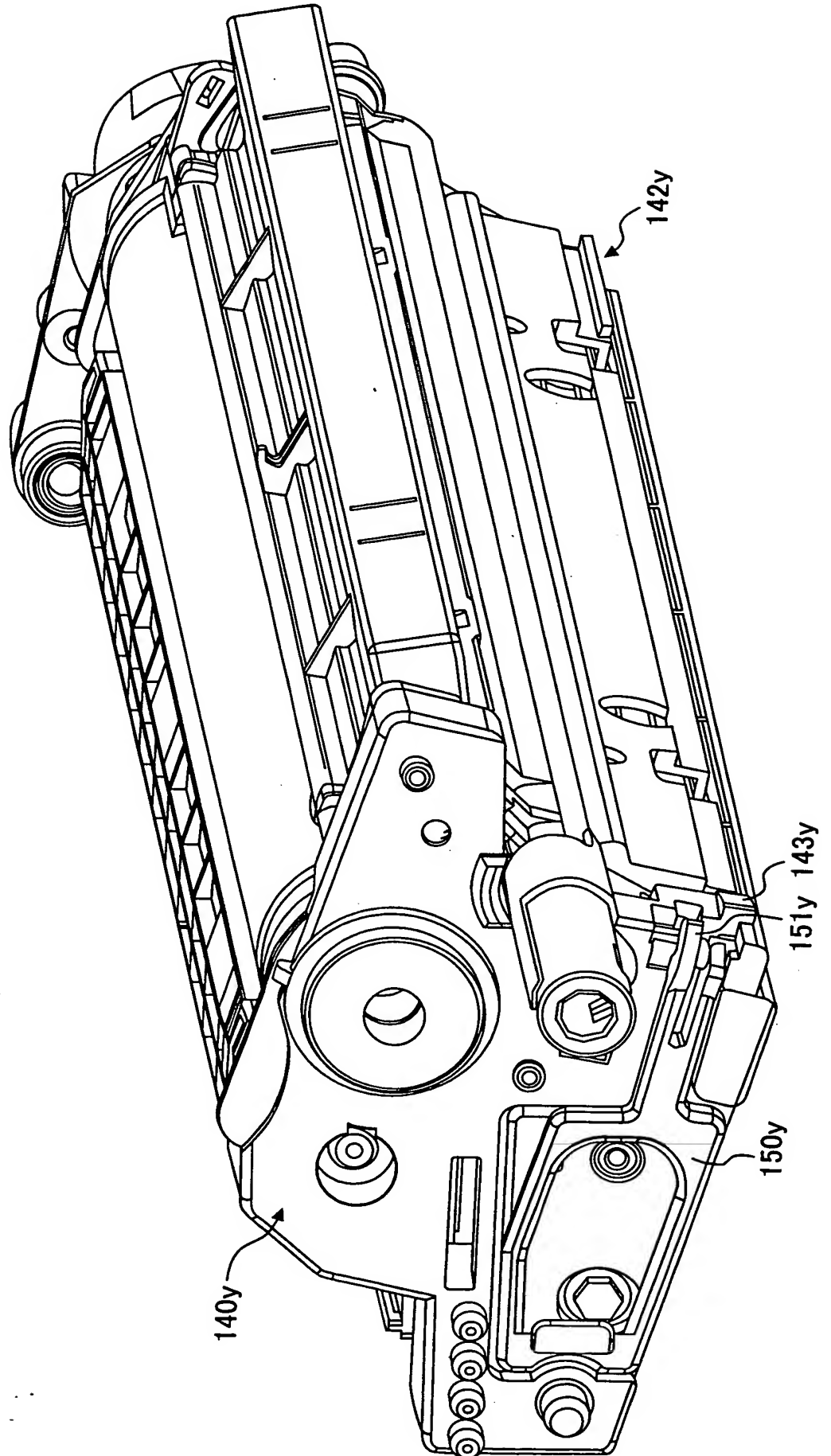
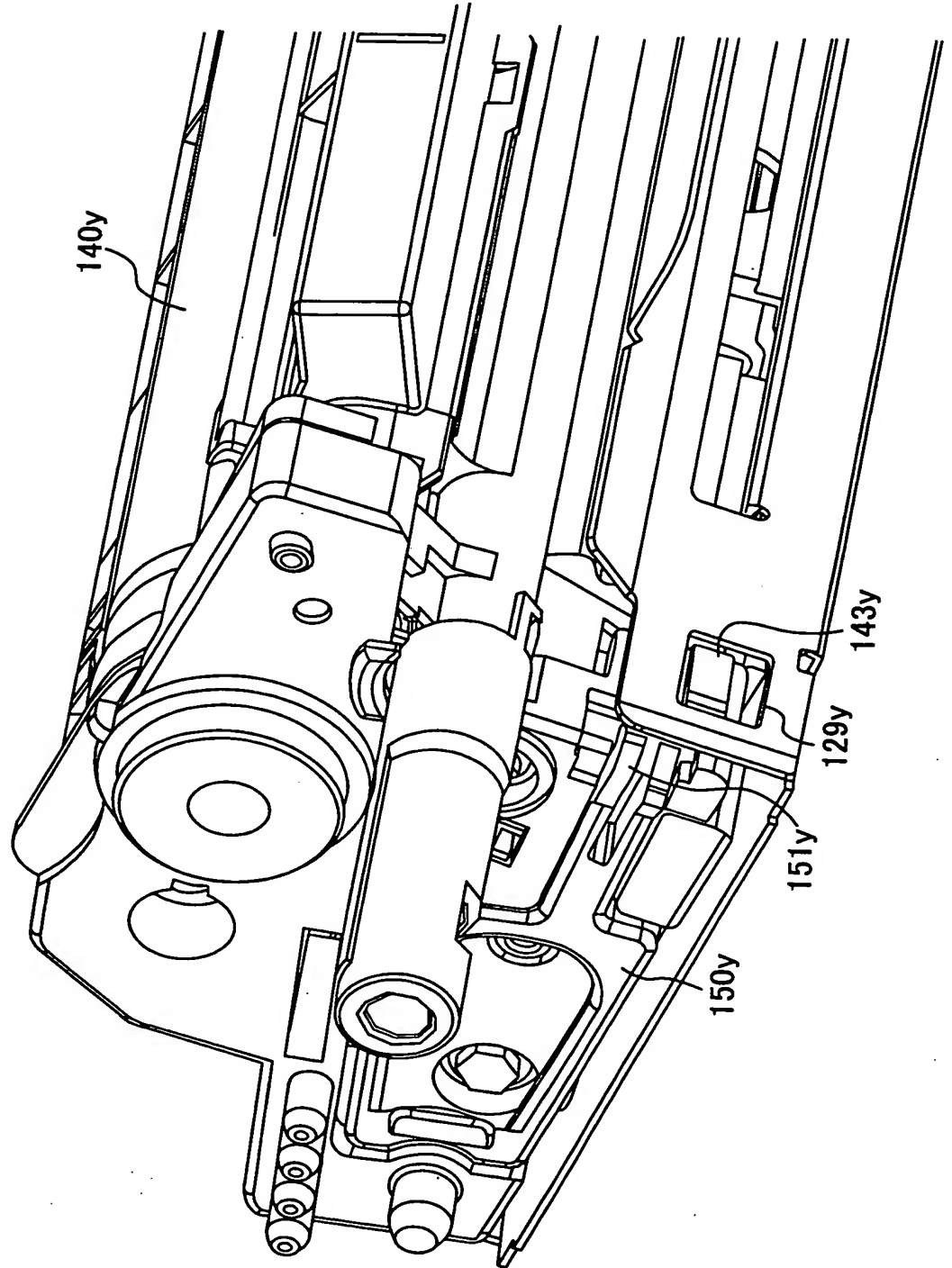


FIG. 12



What is claimed is:

1. A powder conveying device comprising:
a powder storing portion storing powder; and
a pipe configured to guide the powder from said powder storing portion to a destination positioned below said powder storing portion;

wherein said pipe extends downward from said powder storing portion toward the destination, then bends with an inclination angle smaller than a preceding inclination angle relative to a horizontal, and then connects to said destination.

2. The device as claimed in claim 1, wherein a bent portion of said pipe has a larger inside diameter than other portions of said pipe not bent.

3. The device as claimed in claim 1, further comprising locomotive force exerting means disposed in said pipe for exerting locomotive power on the powder present in said pipe toward the destination, wherein said locomotive power exerting means has a locomotive power exerting ability different from a bent portion of said pipe to other portions of said pipe not bent.

4. The device as claimed in claim 3, wherein the bent portion has a larger inside diameter than the other portions.

5. The device as claimed in claim 1, wherein the

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Related Pending Application
Related Case Serial No: 10/742,835
Related Case Filing Date: 12-23-03

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inclination angle is 30° or less in a portion following a bent portion of said pipe.

6. The device as claimed in claim 1, further comprising locomotive force exerting means disposed in said pipe for exerting locomotive power on the powder present in said pipe toward the destination, wherein said locomotive power exerting means has a locomotive power exerting ability different from a bent portion of said pipe to other portions of said pipe not bent.

7. The device as claimed in claim 6, wherein the bent portion has a larger inside diameter than the other portions.

8. An image forming apparatus comprising:

toner image forming means for forming a toner image with powdery toner; and

a toner conveying device configured to convey toner from a toner storing portion to said toner image forming means;

said toner conveying device comprising:

a toner storing portion storing toner; and

a pipe configured to guide the toner from said toner storing portion to a destination positioned below said toner storing portion;

wherein said pipe extends downward from said toner storing portion toward said toner image forming means,

then bends with an inclination angle smaller than a preceding inclination angle relative to a horizontal, and then connects to said toner image forming means.

9. The apparatus as claimed in claim 8, wherein said toner image forming means includes at least an image carrier configured to form a latent image thereon and a developing device configured to develop said latent image, which are constructed into a single unit removably mounted to a body of the apparatus, and wherein said toner storing portion is removable from said body independently of said unit.

10. The apparatus as claimed in claim 8, wherein a bent portion of said pipe has a larger inside diameter than other portions of said pipe not bent.

11. The apparatus as claimed in claim 8, further comprising locomotive force exerting means disposed in said pipe for exerting locomotive power on the toner present in said pipe toward said image forming means, wherein said locomotive power exerting means has a locomotive power exerting ability different from a bent portion of said pipe to other portions of said pipe not bent.

12. The apparatus as claimed in claim 11, wherein the bent portion has a larger inside diameter than the other portions.

13. The device as claimed in claim 8, wherein the inclination angle is 30° or less in a portion following a bent portion of said pipe.

14. The apparatus as claimed in claim 13, further comprising locomotive force exerting means disposed in said pipe for exerting locomotive power on the toner present in said pipe toward said image forming means, wherein said locomotive power exerting means has a locomotive power exerting ability different from a bent portion of said pipe to other portions of said pipe not bent.

15. The apparatus as claimed in claim 14, wherein the bent portion has a larger inside diameter than the other portions.

ABSTRACT

A powder conveying device of the present invention includes a powder storing portion storing powder, and a pipe configured to guide the powder from the powder storing portion to a destination positioned below the powder storing portion. The pipe extends downward from the powder storing portion toward the destination, then bends with an inclination angle smaller than the preceding inclination angle relative to the horizontal, and then connects to the destination.

FIG. 1

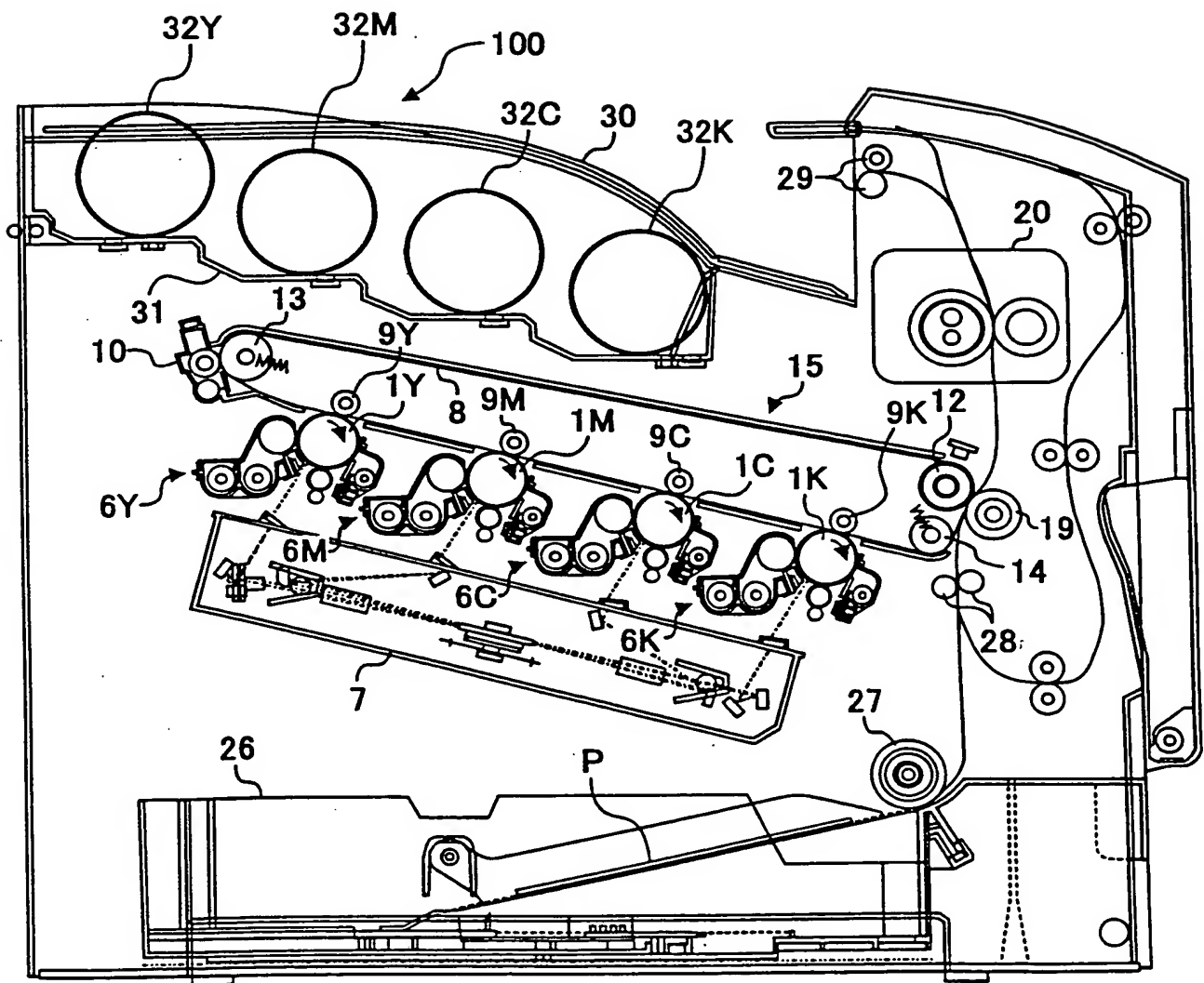


FIG. 2

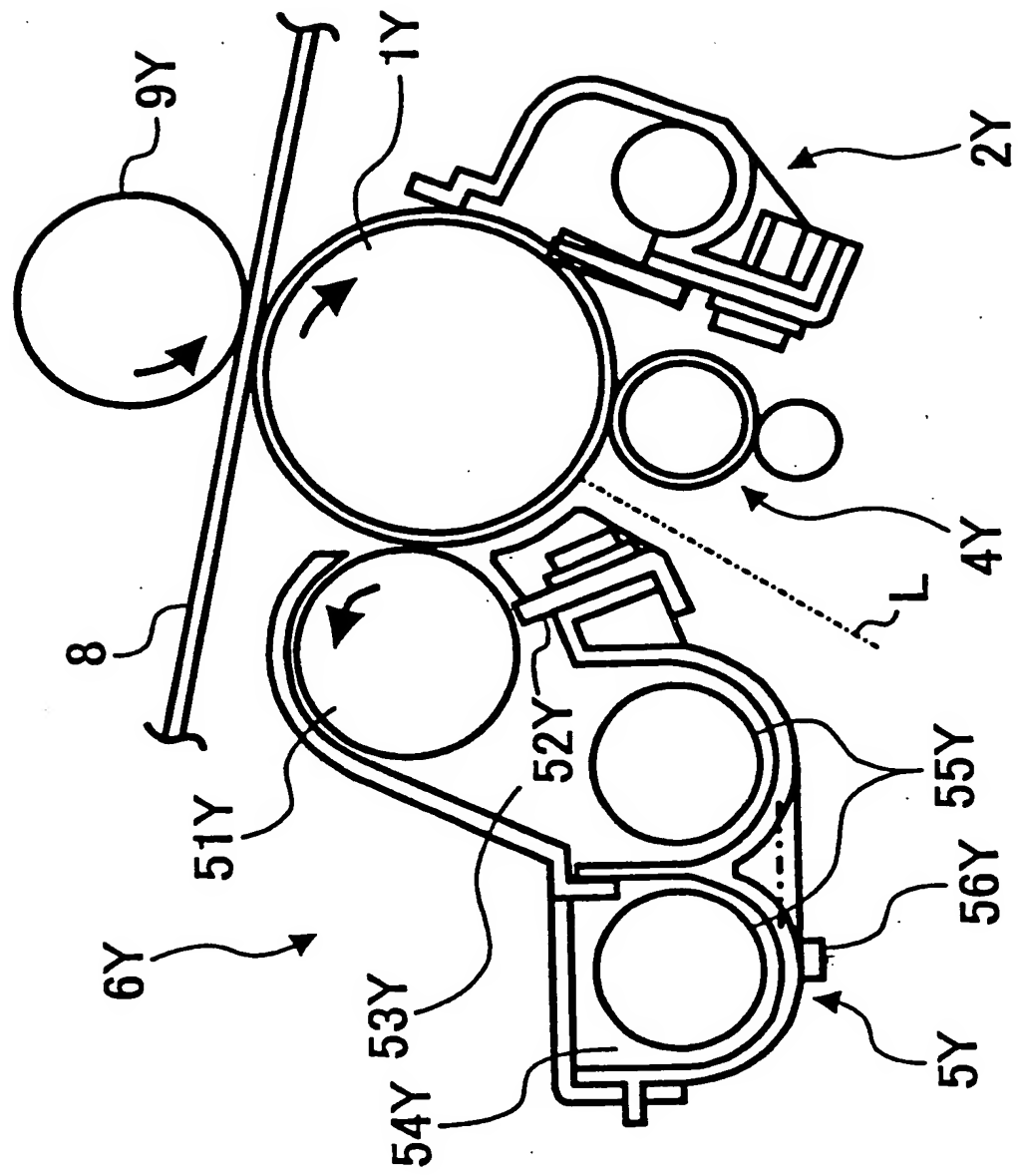


FIG. 3

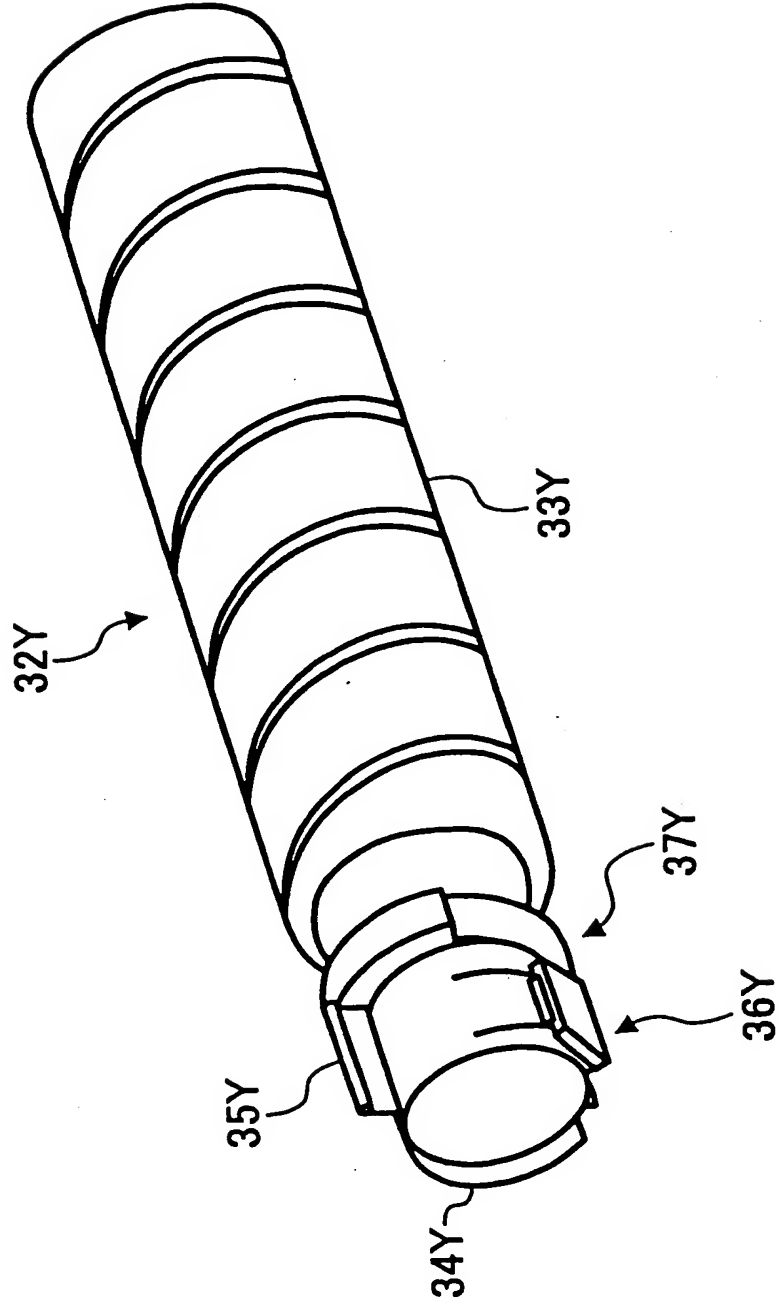


FIG. 4

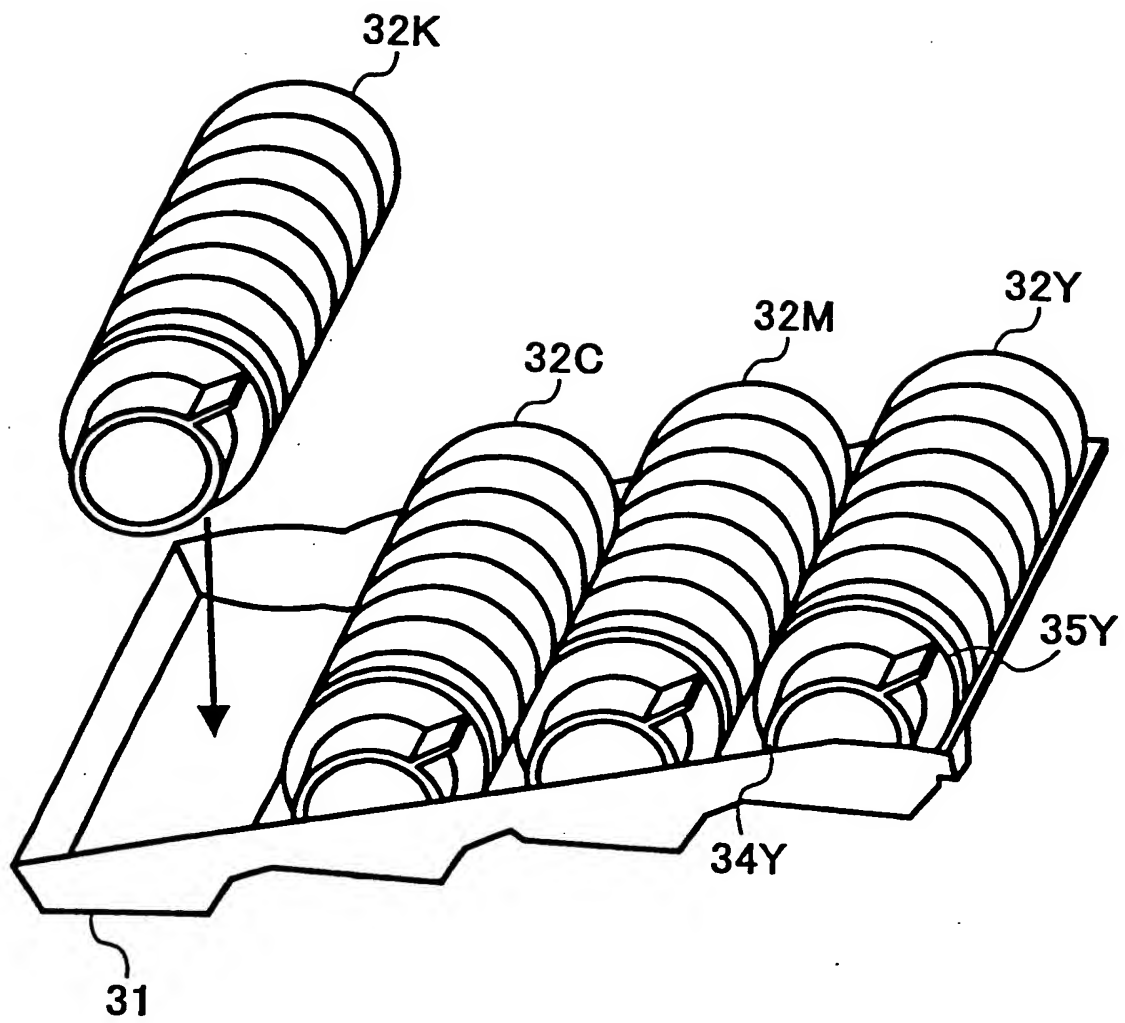


FIG. 5

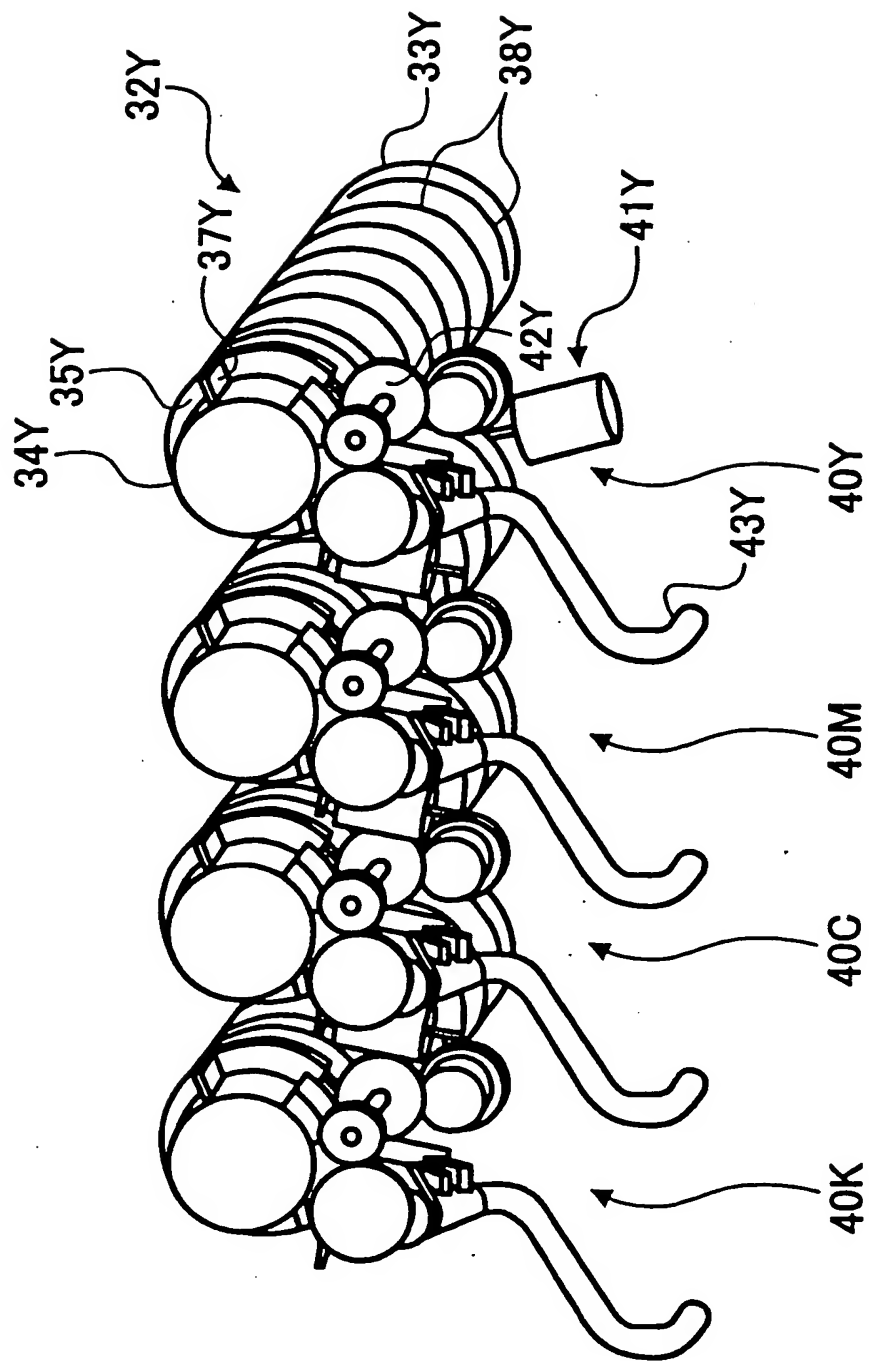


FIG. 6

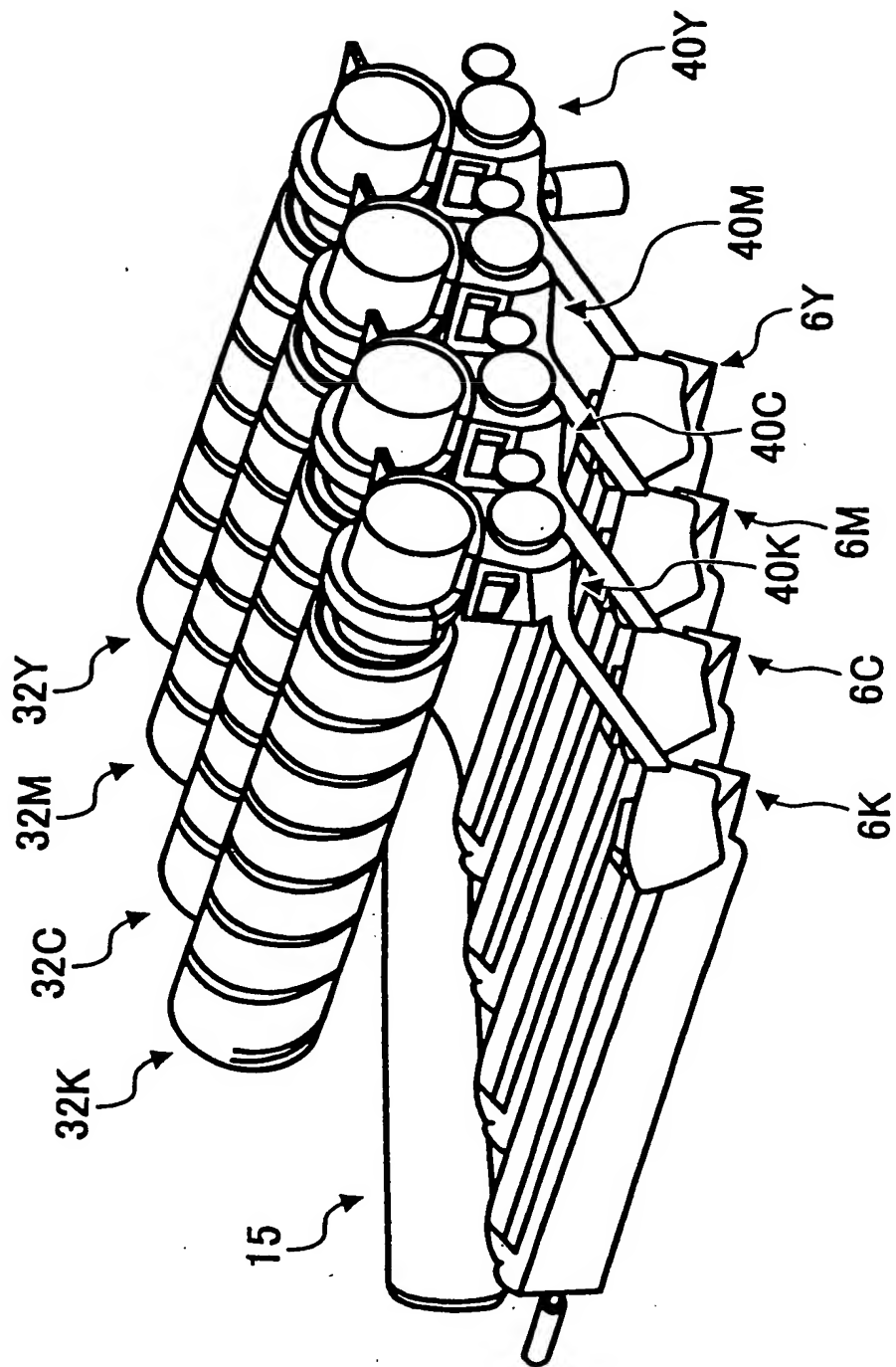


FIG. 7

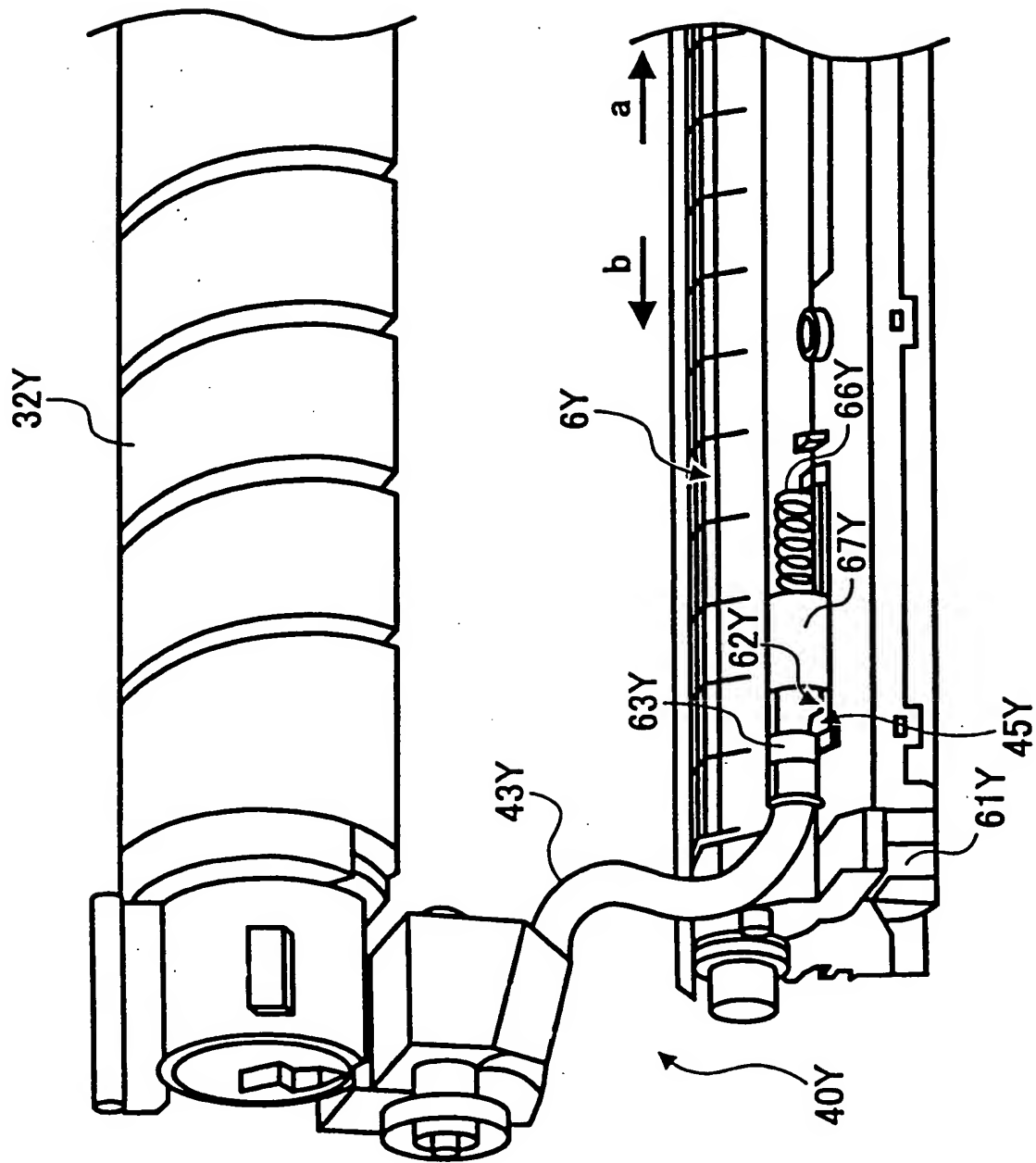


FIG. 8

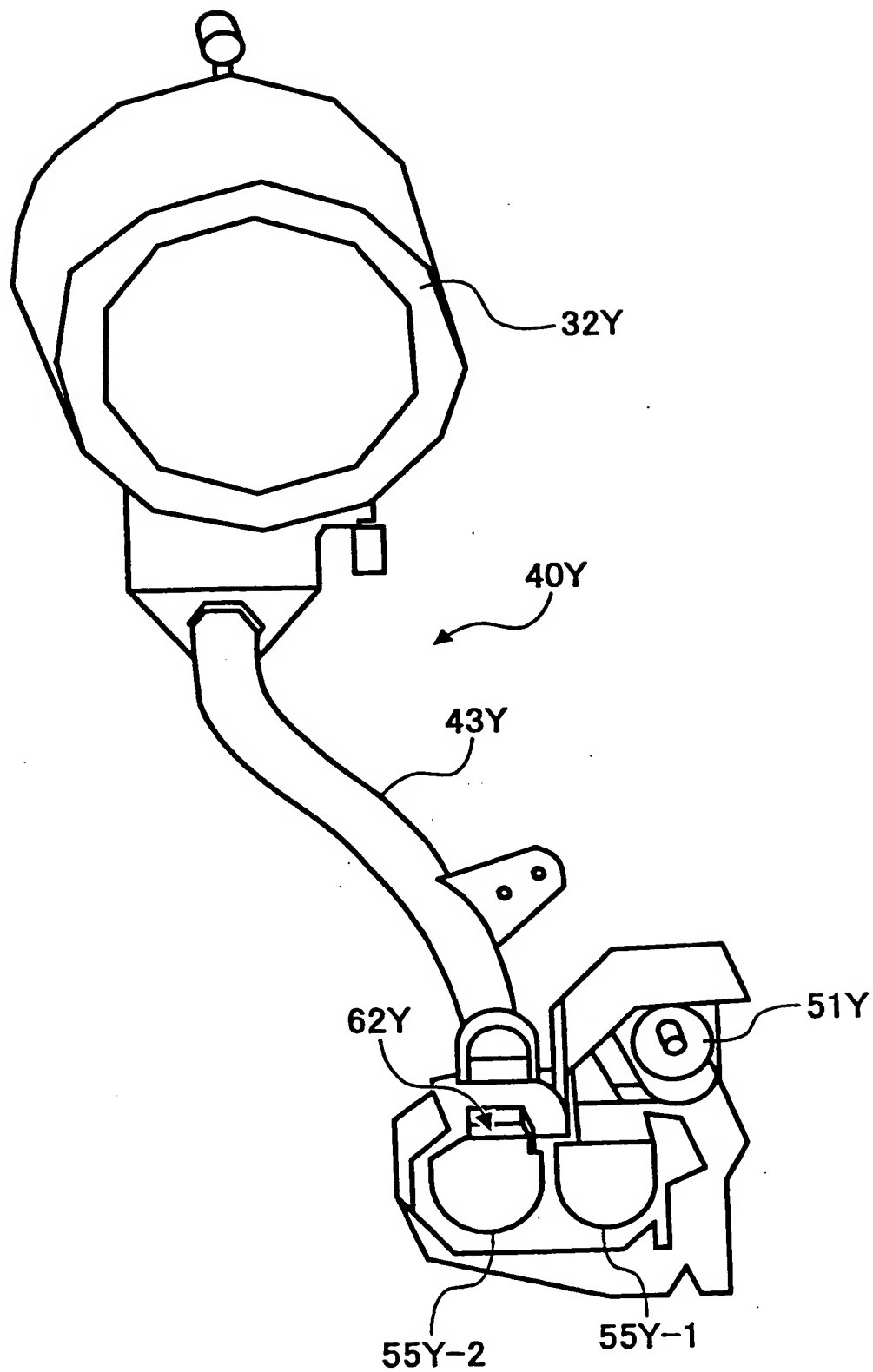


FIG. 9

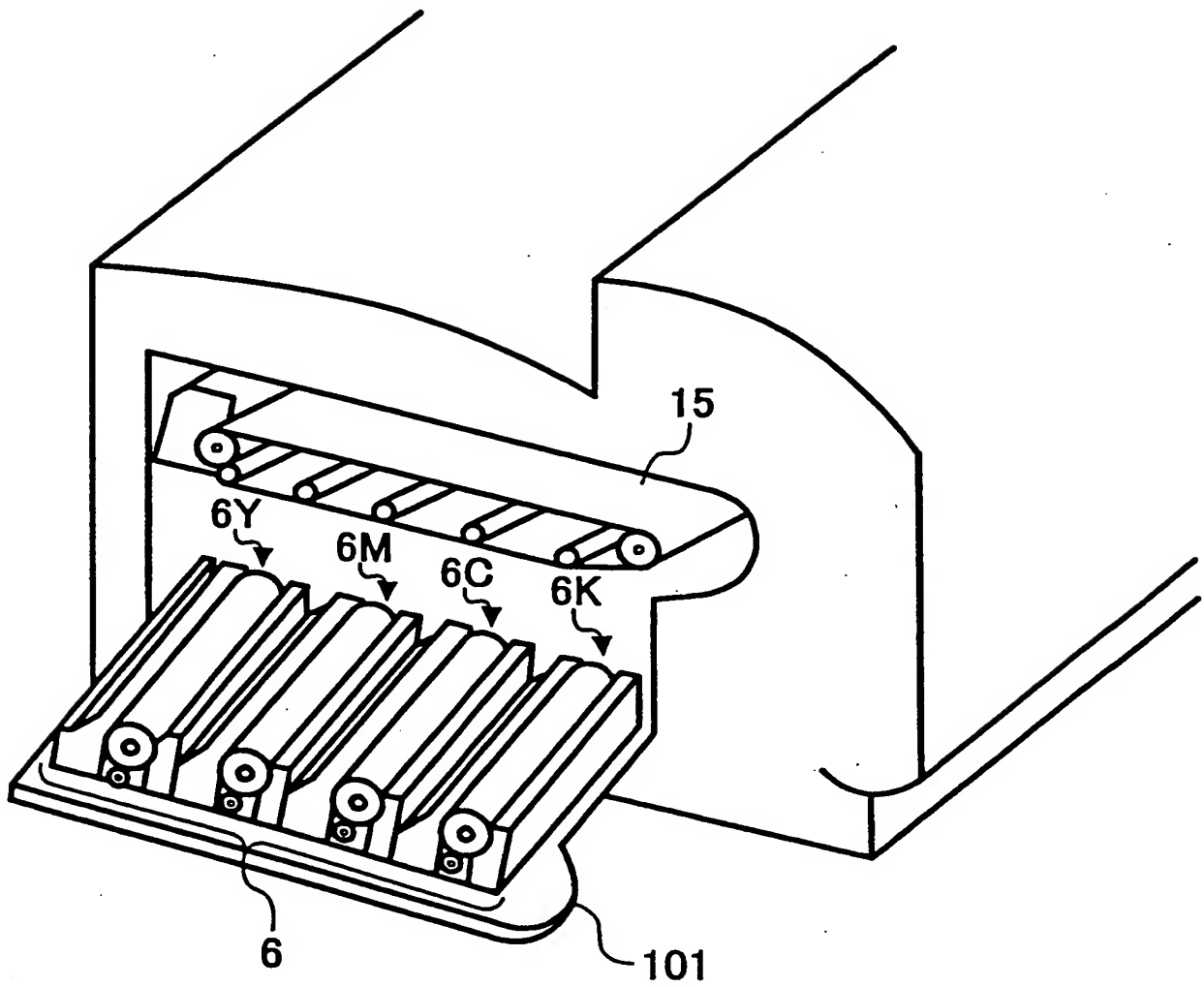


FIG. 10

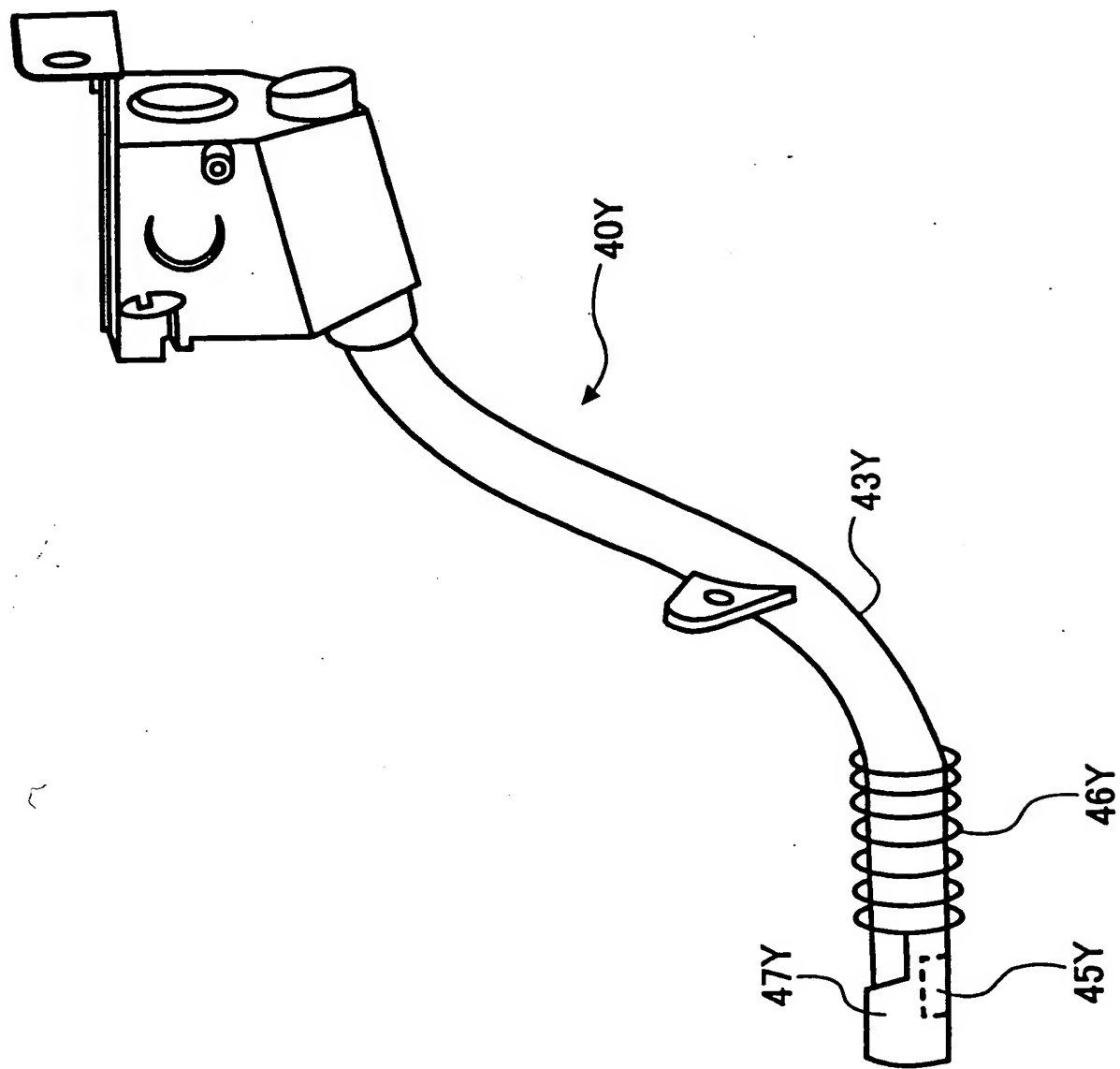


FIG. 11

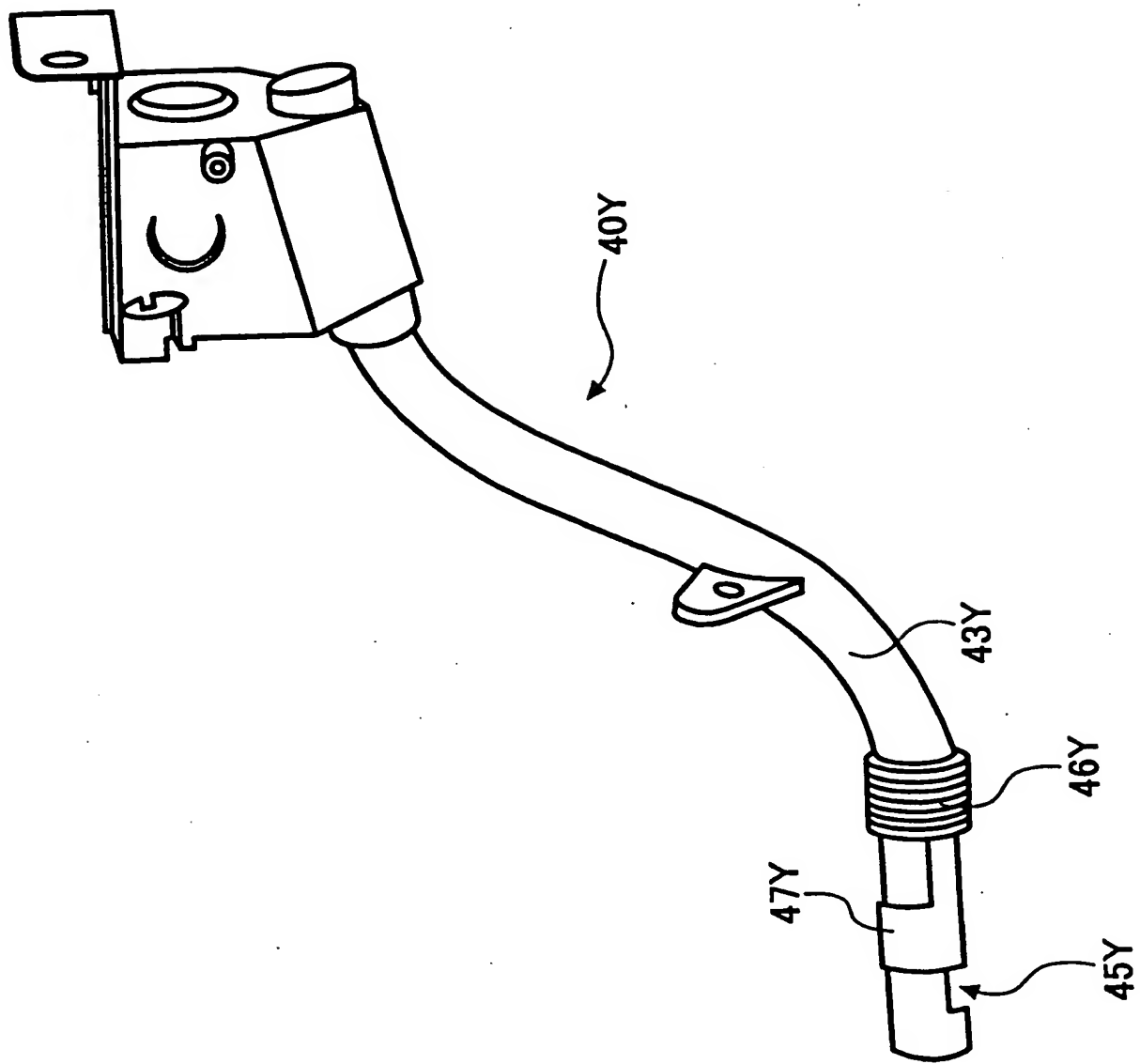


FIG. 12

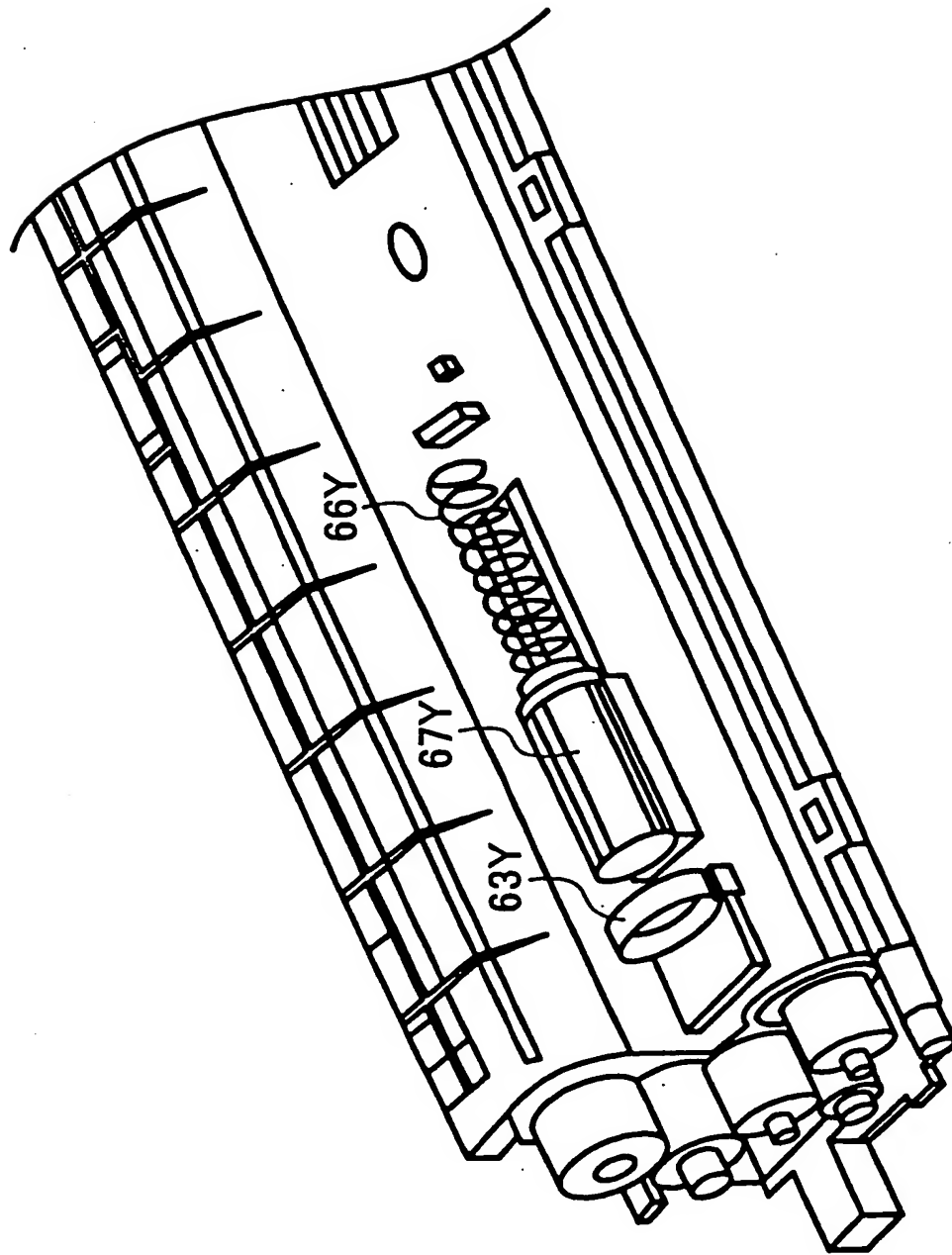


FIG. 13

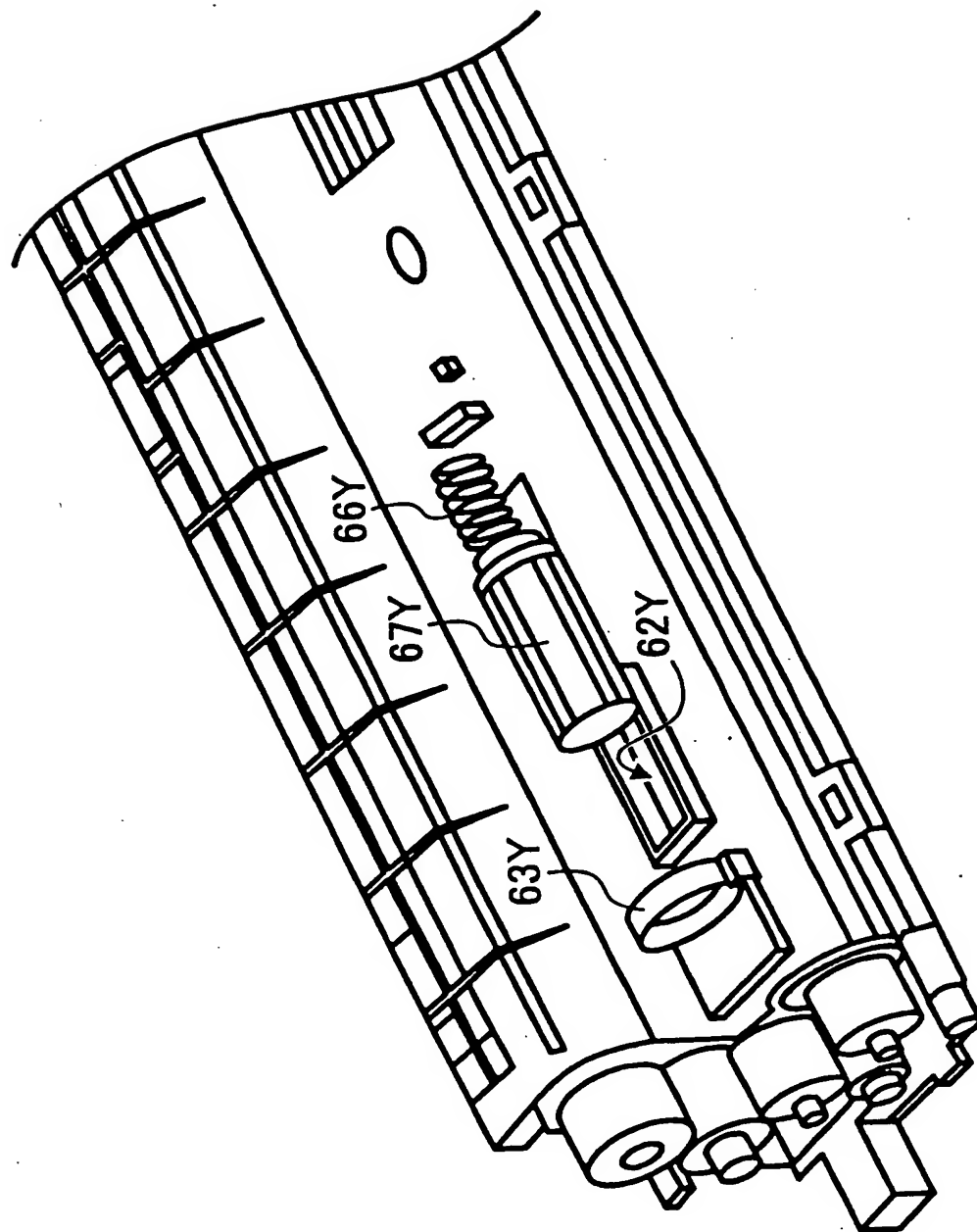


FIG. 14

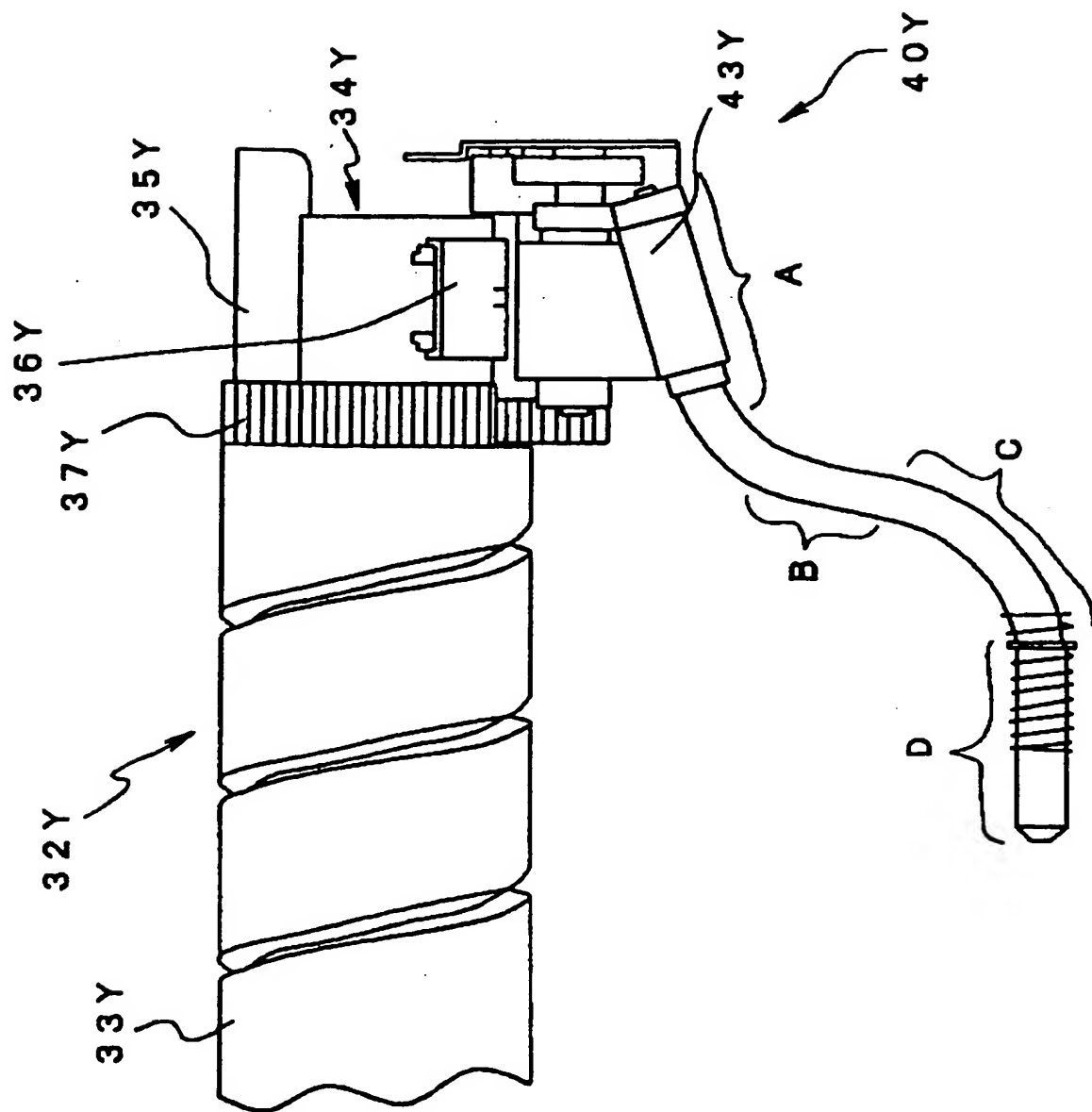


FIG. 15

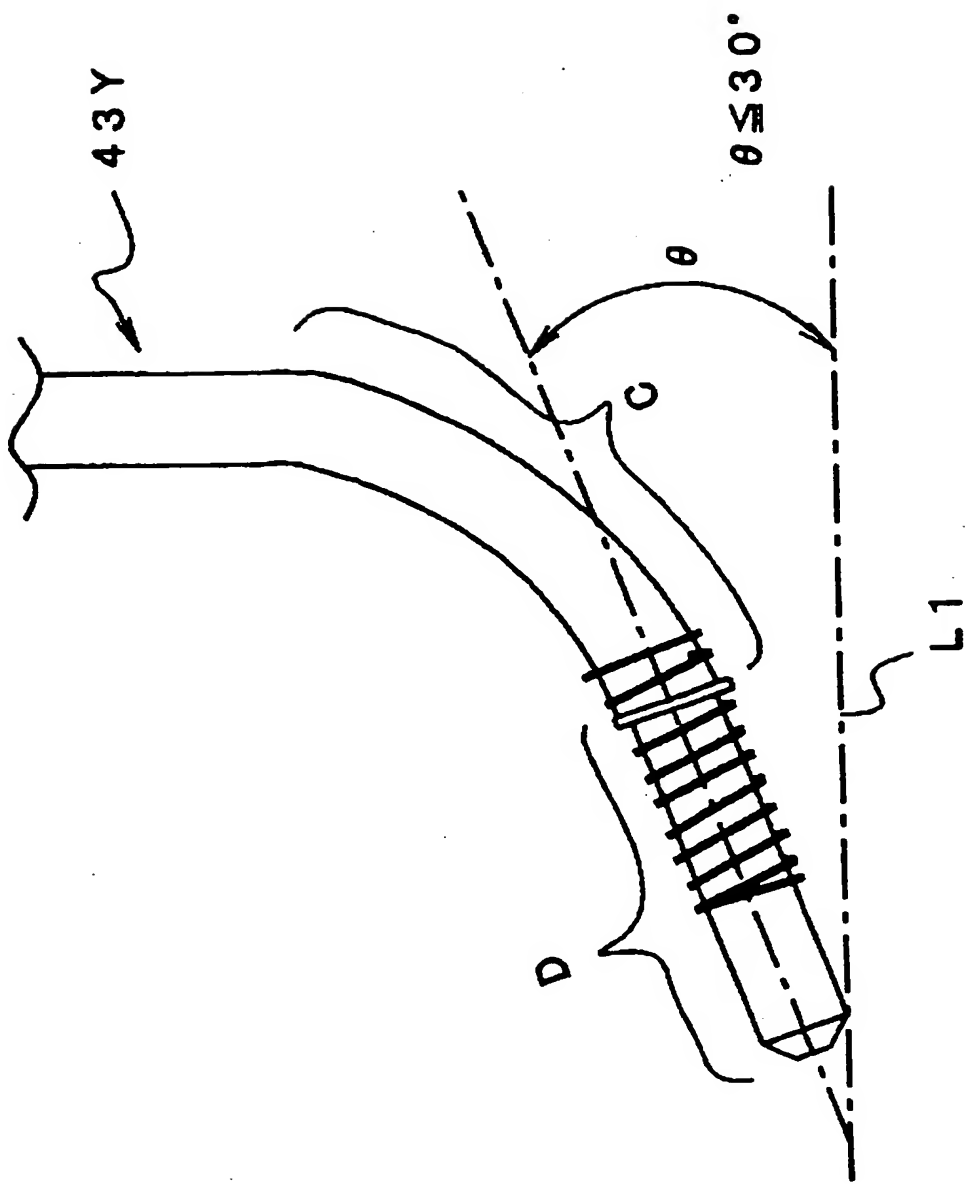


FIG. 16

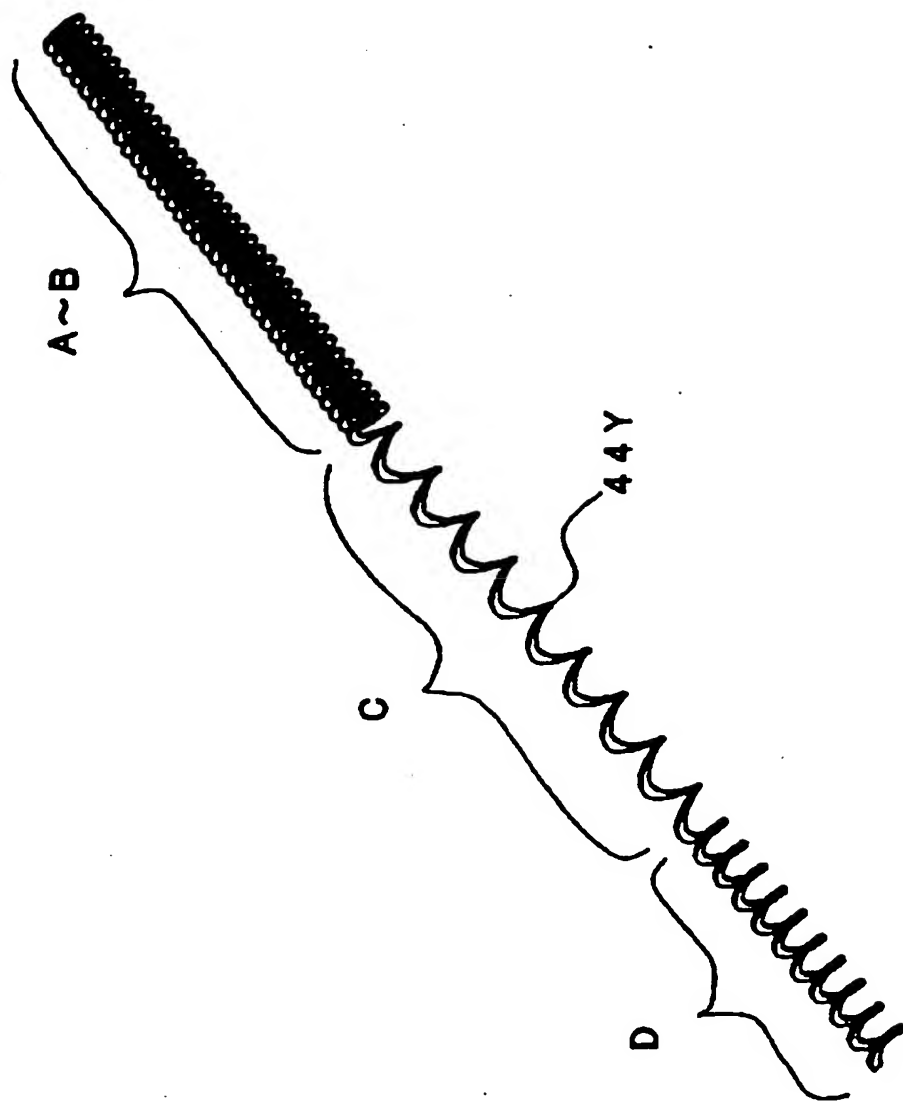


FIG. 17

